UNIV. OF
TORONTO
LIBRARY

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/teachersmonograp15newyuoft

Meet the Syllabus Requirements

GRADED EXERCISES IN ARITHMETIC

By MARIA JURY
Assistant to Principal, Public School No. 10, Boys, Manhattan

JEROME A. O'CONNELL
Member of Board of Examiners, Department of Education, New York City

and EDWARD B. SHALLOW
Associate Superintendent of Schools, New York City

Fourth Year, 1st Half **Fourth Year, 2d Half**

Price, Each, 24 Cents

Fifth Year, 1st Half **Fifth Year, 2d Half** **Sixth Year, 1st Half**

Price, Each, 28 Cents

These problem books supplement the regular text books in arithmetic, and meet the requirements of the Course of Study. East book is divided into five parts, corresponding to the five months of the school term. Each part is subdivided into twenty exercises made up of ten oral and ten written problems, which conform to the needs of that grade as set forth in the Syllabus. The work for each month is preceded by an outline of the topics to be studied, in which the new work is printed in full-faced type.

The problems are of a practical nature, dealing as far as possible with the experiences of everyday life, and quite within the child's comprehension. They are not complicated by the introduction of extraneous subjects which serve to distract the attention of the pupil from the arithmetical principles involved. They are intended to develop in the pupil accuracy and skill in the use of numbers rather than to instruct him in natural history, geography, or the sciences. These books will be found very practical for use in the grades.

AMERICAN BOOK COMPANY

100 WASHINGTON SQUARE NEW YORK CITY

VOL. XV MARCH, 1913. NO. 1

New York Teachers Monographs

READ AND KEPT BY 50,000 TEACHERS.

EDITED BY
MARIE L. BAYER SIDNEY MARSDEN FUERST JAMES A. O'DONNELL

CONTENTS, MARCH, 1913

New Course of Study in Arithmetic—1A to 8B.

PLANS AND DETAILS OF WORK FOR EACH GRADE.
TYPE EXAMPLES UNDER EACH TOPIC AND SUB-TOPIC.

	Page.		Page.
1A	1	5A	69
1B	12	5B	76
2A	22	6A	81
2B	30	6B	89
3A	39	7A	97
3B	47	7B	105
4A	53	8A	111
4B	61	8B	119

YOUR EYES

DETECT DISORDER; CONTROL THE UNRULY.
SEE THAT YOUR EYES FUNCTION NORMALLY.

Dr. BARNETT L. BECKER

studies your temperament as well as your eye sight. He fits eyes, not merely glasses.

215 EAST BROADWAY, Manhattan — Telephone 2365 Orchard
1709 PITKIN AVENUE, Brooklyn — Telephone 2295 East New York
102 LENOX AVENUE, Manhattan — Telephone 449 Harlem

Published March, June, October, December, by New York Teachers Monographs Co., 9 East 17th Street, New York City.

Subscription price is One Dollar a year. Single Copies 30 cents.

Entered at Post Office, New York City, as second-class matter.

Copyrighted March, 1913, by the New York Teachers Monographs Co.

PUBLICATION OFFICE, NEW YORK TEACHERS MONOGRAPHS } 9 E. 17th St., N. Y. City

All letters should be addressed Box 47, Madison Square Post-office, New York City.

New York Teachers Monographs

PLANS AND DETAILS OF GRADE WORK

MARCH 1913

Arithmetic—1A

In teaching addition have cards made and display them as:

$$\begin{array}{r} 3 \\ +\ 1 \\ \hline \end{array}$$

On the back of each card have objects drawn or pasted to represent the combinations. Call upon pupils to read cards "up" and "down," 1 and 3 are 4, 3 and 1 are 4. If the pupil fails to get the correct answer, turn over the card and let him count for himself as: Three tops and one top are four tops. (Figure I.)

1	2	3	4	5	6	7	8	9	0
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
1	1	1	1	1	1	1	1	1	1
+ 1	+ 2	+ 3	+ 4	+ 5	+ 6	+ 7	+ 8	+ 9	+ 0

Drill:

3	7	0	2	8	1	4	9	6	5
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
0	5	8	4	2	6	3	1	9	7
1	9	1	7	1	4	1	3	1	2
7	1	3	1	1	1	9	1	5	1
5	1	0	1	8	1	6	1	1	9
1	4	1	0	1	2	1	8	6	1

Oral problems on + 1 combinations: (1) James paid 3 cents for a book and 1 cent for a pencil. How much did he pay for both? (2) There are 5 boys flying kites, one boy looking on. How many boys are there altogether? (3) Fred has 7 tops and bought 1 more. How many has he now? (4) I paid $1 for a hat and $4 for a coat. How much money did I spend? (5) John lost 1 cent and had 9 cents left. How much money had he at first? (6) Sam had 8 pin wheels, and his brother made 1 more for him. How many had he then? (7) I had 1 blue ball and I won 2 more. How many had I then? (8) Walter is 6 years old. In how many years will he be 7? (9) There were 7 birds on a tree, one more flew on. How many were there then? (10) I bought 9 books and found there were 10 children in the room. How many children had to go without a book?

0	1	2	3	4	5	6	7	8
+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2	+ 2

2	2	2	2	2	2	2	2
+ 1	+ 2	+ 3	+ 4	+ 5	+ 6	+ 7	+ 8
—	—	—	—	—	—	—	—

Drill:

8	5	1	3	0	7	9	2	4	6
2	2	2	2	2	2	2	2	2	2
—	—	—	—	—	—	—	—	—	—
2	2	2	2	2	2	2	2	2	2
0	4	9	6	1	3	7	5	2	8
—	—	—	—	—	—	—	—	—	—
6	2	8	2	2	1	2	7	2	4
2	3	2	2	8	2	4	2	0	2
—	—	—	—	—	—	—	—	—	—
2	8	2	5	2	3	2	0	2	2
5	2	7	2	8	2	6	2	1	9
—	—	—	—	—	—	—	—	—	—

Oral problems on + 2 combinations: (1) Frank spent 8 cents for a book and 2 cents for a pencil. How much money did he spend? (2) Tell a story with 2 + 4 = ? (3) There were 9 birds on a branch of a tree. When I looked again there were 11. What had happened? (4) Tom had $6 in his bank and at Christmas received $2. How much had he then? (5) I paid $2 for a pair of shoes and $7 for a suit. How much did I spend? (6) Mary had 2 dolls and at Christmas received 2. How many did she then have? (7) Jack is 9 years old. Jennie is 2 years older. How old is Jennie? (8) We read 8 pages in one reader and 2 pages in another. How many pages did we read. (9) May paid 2 cents for a stamp and 3 cents for postals. How much money did she spend? (10) There were 5 wooden houses on one side of the street and 2 brick houses on the other side. How many houses were on the block?

Drill Table in Addition—For Rapid Oral Work—Use this table frequently until accuracy and rapidity in making the combinations are acquired:

Further drill in addition: (Figure III.)

(1) Add 1 to each of the above numbers. (2) Add 2 to each of the above numbers.

Drill Exercises—The following exercises are designed for rapid work in addition and subtraction: (Figures IV, V, VI, VII.)

Reading Numbers—Drill cards, showing the various numbers from 1 to 100 should be prepared and used daily to facilitate sight reading. Figures VIII, IX, X.

Reading Numbers—First and second month.

Recognition—Fifth month.

FIRST MONTH.

First Week.

(1) Counting 1-3 (with objects); further if practicable.

(2) Reading numbers 0, 1, 2.

(3) Addition combination, 1
2
—

(4) Written—Numbers 0, 1.

(1) Counting—Objects in room counted, as windows, doors, chalk, panes of glass in each window, desks, pencils, books, pictures, splints and

Fig. I

3
+1
—

Fig. IV

4 6 9 3 +1 5 7 8 2

Fig. V

8 6 4 1 +2 2 3 7 5

Fig. VI

No. 60 to 100
No. 30 to 60
No. 10 to 30
6 8 10 5 3 9 1 7 4 2

Fig. II

A	B	C	D	E
0+0	2+5	8+0	1+2	0+3
0+9	0+6	1+6	2+6	4+2
5+0	0+2	2+1	7+0	1+5
1+0	1+1	1+3	2+3	0+1
7+1	1+9	2+2	1+8	7+1
9+0	5+1	5+2	4+0	6+2
1+4	6+2	2+0	3+2	1+6
0+7	2+8	7+2	0+8	0+9
3+0	6+0	6+1	0+4	2+7
3+1	9+1	8+2	8+1	2+4

Fig. III

5	8	1	9	3	6	2	7	4	0

Fig. II

5		4
3		7
0	+1	9
8		2
1		6

Fig. III

8		7
5	+2	4
3		5
1		6

Fig. II

A	B	C	D	E
8	18	2	12	4
19	2	11	16	10
0	9	18	3	13
6	16	5	15	7
12	0	9	19	8
17	7	16	6	3
5	11	13	0	1
15	19	11	13	16
4	14	16	10	15

Fig. I

A	B	C	D	E
54	87	20	63	42
75	39	96	57	69
46	28	77	84	95
68	59	86	25	44
99	62	48	73	51
27	45	64	92	49
56	65	74	47	67
43	34	83	38	22
55	88	97	79	58

cards distributed and counted; children counted: also parts of the body, as eyes, ears, hands, fingers, etc. Use counting games, rhymes and songs.

Counting Game—One little, 2 little, 3 little boys; 4 little, 5 little, 6 little

boys; 7 little, 8 little, 9 little boys; 10 little 1A boys, all in a row. A game of this nature will interest the child at once.

Ladder Game—The ladder game serves well in counting. Soon they recognize the figure and associate the reading of the figure with the figure itself.

(2) Reading Numbers—Pieces of oak tag with the figures upon them should be used. The figures should also be written on the board with colored chalk. The teacher points to a figure on the board and asks a pupil to point out that number of boys, or take that number of pencils from the box, or to clap his hands that number of times, and so on till the numbers to be taught are exhausted.

(3) Addition Combinations—Children are asked to raise one hand; then another; the result is 1 and 1 are 2. Take 1 splint and place it on your desk; place another on the desk. Read the whole story: 1 splint and 1 splint are 2 splints. The teacher should put many drawings on the board, as: 1 flag and 1 flag, 1 pennant and 1 pennant, 1 snowball and 1 snowball, and have individual pupils tell the story of each. Have children called to the front of the room and read the story of 1 and 1, pointing to objects in the room.

Place on the blackboard

$$\begin{array}{r} 1 \\ 1 \\ \hline \end{array}$$

(1) Willie called his mother to see a robin in the tree, and while they were looking another flew in the tree; how many robins in the tree now? (2) If pencils are 1 cent each, how many can I buy for 2 cents? (3) Little Frank has a cent in each hand; how much money has he? (4) There is 1 flag on the desk; put 1 more there; how many are there now? (5) Tell a story about 1 and 1.

(4) Written—Numbers 0, 1—Particular attention must be given to the correct formation of figures. Have individual work at the board. Have many exercises to insure the correct formation of figures. At the board have the children trace the numbers made by the teacher. The tracing should be done until the correct formation is assured. Then erase and have the child write the numbers from memory. Numbers should also be written on papers and distributed to the class to be traced as busy work. Then on the other side of the paper they may write the number from memory.

Second Week.

(1) Counting, 1—5.

(2) Reading Numbers, 0, 1, 2, 3, 4, 5.

(3) Addition combinations,

$$\begin{array}{r} 2 \\ +\ 1 \\ \hline \end{array}$$

(4) Written—Numbers 0, 1, 2.

(5) Measurements—Steps around the room.

Counting—Pictures may be distributed, 5 of one kind, 4 of another, 3 of another. Think of the pleasure manifested by the child in counting the individual pictures given him, as: "I have 1, 2, 3, 4, 5 horses." "There are 1, 2, 3, 4 boys flying kites." "I have 1, 2, 3 violins."

Motions—Bounce a ball with your right hand and count 1, 2, 3, 4, 5. Clap hands and count to 5. Tramp feet and count to 5.

Reading Numbers—Arrange the figures from 1 to 5 on the board and have individual pupils read them, teacher pointing. Have pupils take pointer and teacher dictating, point to 5, 3, 2, 1, 4, 0. Have children erase numbers from board, naming it before he does so.

Addition Combination $\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$

(1) Draw 2 kites, then another; the result is 2 and 1 are 3. (2) Draw 2 horns, then another; the result is 2 and 1 are 3. (3) Draw 2 tops, then another; the result is 2 and 1 are 3.

Have the children tell stories about 2 and 1, using objects in the room or things seen outside of school. Also have them clearly understand that the result is the same whether the addition is upward or downward as, $\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$ $\begin{array}{r} 1 \\ 2 \\ \hline \end{array}$

Have them repeat 2 and 1 are 3, 1 and 2 are 3. Place on the blackboard

$\begin{array}{r} 1 \\ 2 \\ \hline \end{array}$ $\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$

(1) I have 2 oranges and John gave me 1 more; how many have I then? (2) How much will one 2-cent stamp and one 1-cent postal cost? (3) I spent $1 on Monday and $2 on Tuesday; how much money did I spend? (4) I had 2 marbles and won 1 in a game; how many had I then? (5) Tell a story about 2 and 1.

Written—Trace on board and papers numbers 1, 2. After sufficient drill, have pupils write them from memory.

THIRD WEEK.

(1) Counting 1—8 (with objects).

(2) Reading Numbers—0, 1, 2, 3, 4, 5, 6, 7, 8.

(3) Addition Combination $\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$

(4) Written—Numbers 0, 1, 2, 3.

Counting—Let the children choose pictures of (1) toys, as tops, balls, bats, marbles, horns, whistles, guns, balloons, etc. (2) Animals, as ducks, turkeys, dogs, cats, squirrels, mice, etc. (3) Fruits, as pears, apples, peaches, plums, grapes, bananas, etc.

Reading Numbers—(1) Arrange numbers in two lines, as 0, 1, 3, 5, 7, and 2, 4, 6, 8, and have children read the lines, beginning at the top and proceeding down, and then at the bottom to the top, as 7, 5, 3, 1, 0, or 8, 6, 4, 2. Teacher should also point out and call upon individual child to name the number which she is pointing at. If this is done, every child gets a chance to do some individual work.

Addition Combination $\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$ and reverse.

(1) Draw 4 apples, then 1 more; the result is 4 and 1 are 5. (2) Place 4 pencils on the desk, then 1 more; count and tell me the result. (3) Take 4 splints, place 1 beside it; result, 4 splints and 1 splint are 5 splints.

	4	1
Place on the blackboard	1	4
	—	—

(1) One boy and four girls are playing; how many children are playing? (2) A man had $4 in one pocket and $1 in another; how many dollars in both pockets? (3) A pencil cost 1 cent and a copy book 4 cents; find the cost of both. (4) Frank stayed home from school 3 days last week and 1 day this week; how many days was he absent in the two weeks? (5) I saw 4 birds on a tree, one more came; how many birds did I see then?

Written—Numbers 0, 1, 2, 3.—(1) Trace numbers on board. (2) Trace numbers on paper. (3) Fold a paper into 16 boxes, and on the first set of boxes write 0, 0, 0, 0; second, 1, 1, 1, 1; third, write 2, 2, 2, 2, and on the fourth set of boxes write 3, 3, 3, 3.

Fourth Week.

(1) Counting to 10.

(2) Reading Numbers—0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

	4	
(3) Addition Combination	1	
	—	

(4) Written—Numbers 0, 1, 2, 3, 4.

(5) Measurements—Spans, cupful.

Counting—(1) Count the number of rows of seats in your room. (2) Pace ten paces and count as you pace. (3) Have ten children stand and have some child count them. (4) Count the number of boys in one row. (5) Sticks, chalk, marbles, candy, apples, and many other similar objects may be used for counting, but care must be exercised to keep within 10.

Reading Numbers—The ladder game will now serve well in recognizing the figures. Another valuable aid is to arrange the figures from 1 to 10 promiscuously on the blackboard, and have the children read, as:

		1					9		
	2		4					7	
3				6			1		5
	5			8				3	
	7			9		1	3	5	7	9
		10							
						2	4	6	8	10

	4	1
Addition Combination	1	4
	—	—

Illustrations—(1) Take 4 pencils, place 1 more beside them; read the whole story. (2) Raise 4 fingers on the left hand; one finger on the right; tell the story. (3) There are 4 pieces of chalk on the blackboard; put one more there; how many are there then?

	3	1	4	2	1	1	1
The teacher in review writes on the blackboard	1	2	1	1	3	4	1
	—	—	—	—	—	—	—

Children are sent to the board and told to write the answer to the combinations.

(1) Choose 3 balls, then another; result, 3 and 1 are 4. (2) Take 1 splint, place 2 with it; result, 1 and 2 are 3. (3) 1 and 1 are 2. (4) 2 and 1 are 3. (5) 1 and 3 are 4. (6) 4 and 1 are 5. (7) How much will one 2-cent stamp and four 1-cent post cards cost? (8) A man has 3 horses and bought 1 more; how many has he now? (9) Sam has 2 cents in his toy bank; his mother puts in 1 more; how many cents has he in the bank? (10) I had 4 kites and I bought 1 more; how many had I then?

Fifth Week.

(1) Counting 1 to 12 (without objects).

(2) Reading numbers 0 to 12.

	5	1
(3) Addition Combination	1	5
	—	—

(4) Written—Numbers 0, 1, 2, 3, 4, 5. At board or seats:

1	1	1	1	1	1	4	1	1	1
0	1	1	3	2	1	0	0	0	0
1	1	2	1	1	3	1	4	2	3
—	—	—	—	—	—	—	—	—	—
	2	1	1	4	1	5	1	1	
	1	1	3	1	5	1	2	4	
	—	—	—	—	—	—	—	—	

Dictate Numbers—3, 0, 2, 5, 4, 1.

Sixth Week.

(1) Counting 1 to 14 (without objects).

(2) Reading numbers to 14.

	6	1
(3) Addition Combination	1	6
	—	—

(4) Written—(1) 0, 1, 2, 3, 4, 5, 6.

First Day—

5	3	4	2	1	6
1	1	1	1	1	1
—	—	—	—	—	—

Second Day—

1	1	1	1	1	1
3	2	4	5	1	6
—	—	—	—	—	—

Third Day—

5	1	4	1	6	1
1	3	1	5	1	2
—	—	—	—	—	—

Fourth Day—

31	51	14	61	11	11
12	13	11	12	45	16
—	—	—	—	—	—

Fifth Day—

53	11	16	51	41	61
11	32	11	13	15	12
—	—	—	—	—	—

Seventh Week.

(1) Counting 1 to 18.

(2) Reading numbers 0 to 18.

(3) Addition combination

7	1
1	7
—	—

(4) Written—0 to 7.

First Day—

1	1	1	1	1	1
5	4	3	2	1	6
1	1	1	1	1	1
—	—	—	—	—	—
1	1	1	1	1	1
6	5	4	3	2	7
—	—	—	—	—	—

Second Day—

5	3	2	4	6	7
1	1	1	1	1	1
—	—	—	—	—	—
1	1	1	1	1	1
7	5	3	2	6	4
—	—	—	—	—	—
53	24	67	75	32	64
11	11	11	11	11	11
—	—	—	—	—	—
11	11	11	11	11	11
23	67	45	57	13	63
—	—	—	—	—	—

Third Day—

51	21	61	71	31	61
13	14	17	15	12	14
—	—	—	—	—	—

Fourth Day—

13	17	15	17	13	13
21	61	41	51	21	61
—	—	—	—	—	—

Fifth Day—

71	53	64	16	51	41
16	11	11	71	13	14

Eighth Week.

(1) Counting 1 to 20

(2) Reading numbers 0 to 20.

(3) Addition combination

8	1
1	8

(4) Written—0, 1, 2, 3, 4, 5, 6, 7, 8.

First Day—

6	7	1	1	4	2	1	1
1	1	5	3	1	1	1	8

1	1	1	1	1
1	3	1	6	1
4	1	2	1	7

Second Day—

5	1	7	1	4	1	2	1
1	6	1	8	1	3	1	1

51	71	14	41	12	21
16	18	81	13	31	11

Third Day—

1	1	1	1	1	1
1	5	1	1	1	7
6	1	3	7	3	1
67	71	11	14	42	11
11	15	53	31	11	18

Fourth Day—

$1+5=?$	$5+1=?$	5	4	1	7	1
$1+6=?$	$6+1=?$	1	1	6	1	8
$1+7=?$	$7+1=?$	—	—	—	—	—
$1+8=?$	$8+1=?$					

Fifth Day—

17	26	31	41	51	15
11	11	18	17	16	41

Ninth Week.

(1) Counting 1 to 20.

(2) Reading numbers 0 to 25.

(3) Addition combination

9	1
1	9

(4) Measuring contents of pitcher by glassfuls.

(5) Written—0 to 9.

First Day—

				1	1	1	1		
1	6	1	8	1	6	1	8	9	1
5	1	7	1	4	1	7	1	1	9

Second Day—

$2+1+1=?$	$6+1+1=?$
$3+1+1=?$	$1+7+1=?$
$1+4+1=?$	$1+8+1=?$
$1+5+1=?$	$8+1+1=?$

Third Day—

16	61	18	81	61	18
51	17	71	14	17	71
—	—	—	—	—	—

Fourth Day—

1	1	1	1	1	1
1	6	1	5	7	1
3	1	4	1	1	8
—	—	—	—	—	—

Fifth Day—

6	1	1	7	1	9
1	5	4	1	8	1
—	—	—	—	—	—
61	11	17	69	71	19
15	54	41	11	18	81
—	—	—	—	—	—

Tenth Week.

(1) Counting 1 to 20.
(2) Counting 2 to 8
(3) Reading numbers 0 to 30

(4) Addition combination

2
2
—

(5) Written—0 to 10.

First Day—

1	7	1	9	1	2
6	1	8	1	1	2
—	—	—	—	—	—

Second Day—

$6+1=?$	$2+1+1=?$
$7+1=?$	$5+1+1=?$
$1+8=?$	$1+6+1=?$
$9+1=?$	$5+1+1=?$

Third Day—

16	26	21	41	18	61
11	11	71	13	71	13
—	—	—	—	—	—

Fourth Day—

6	8	9	7	5	2
1	1	1	1	1	2

	1	1	1	1	1	2
	5	7	8	6	9	2
	—	—	—	—	—	—

Fifth Day—

68	89	97	75	52	27
11	11	11	11	12	21
—	—	—	—	—	—
11	18	11	67	12	27
57	11	86	11	72	21
—	—	—	—	—	—

Type Examples for First Year—First Half—(1) In one pasture there are 4 cows and in another 2. How many in both pastures? (2) I saw 3 boys on 1 sled and 2 on another. How many children did I see on both? (3) Mary paid 5 cents for a pad, 2 cents for a pencil. What did she pay for both? (4) A hat cost $4 and a pair of shoes $2. What is the cost of both? (5) There were 9 horses in the fields; the farmer put in 2 more. How many were there then? (6) Henry had $9 in the bank; his father gave him $1 more. How many did he then have? (7) Willie is 8 years old; his brother is 6 years old. How much older is Willie than his brother? (8) Fannie has 4 pencils and buys one more. How many has she then? (9) Arthur bought a pad for 8 cents and a pencil for 2 cents. How much change did he receive from a dime? (10) There are 7 girls and 2 boys in a music class. There are — children in the class? (11) John had 9 marbles and won 1 more. How many did he then have? (12) A dressmaker spent 6 cents for a spool of thread, 10 cents for a spool of silk, and 3 cents for a paper of pins. How much did she spend in all? (13) Irma had 2 cents, a 5 cent piece and a 10 cent piece. How much money had she? (14) A milkman sold 2 quarts of milk at one house, 4 quarts at another house, and 2 quarts at the third house. How many quarts of milk did he sell in all? (15) I saved $1 in September and $1 in October. How much money did I save? (16) I ordered 3 pumpkin pies and 2 lemon pies. How many pies did I order? (17) John lost 2 cents and had 3 cents left. How much money had he at first? (18) How much money do you need to pay for two 2-cent stamps? (19) William took a walk of 5 miles in the morning and 2 miles in the afternoon. How many miles did he walk? (20) I have 1 colored splint; John gave me 8 more. How many have I now? (21) There are 4 pieces of chalk on the blackboard; put 2 more there. How many are there then? (22) How much will one 2-cent stamp and one 1-cent postal cost? (23) Five little boys were picking up sticks; one more came. How many were there then? (24) I saw 8 birds on a tree; when I looked again there were 9. What happened? (25) Paid 1 cent for a book, 1 cent for a pencil, 1 cent for a rubber, 2 cents for a stamp. Handed the man 5 cents. How much change? (26) Harold was awakened at 7 o'clock; his sister May rose 1 hour later. When did May get up? (27) I saved 1 cent each day for 7 days. How many cents did I have then? (28) A farmer sold 9 boxes of eggs one day, 11 boxes on the second day. How many more boxes did he sell on the second than on the first day? (29) Paid 10 cents for fare, 3 cents for milk, 2 cents for a book. How much money did I spend? (30) Ida has 8 cents, Jennie has 4 cents. How much money have both?

Arithmetic—1B

Addition combinations, plus 3:

3	4	5	6	7	8	9
+ 3	+ 3	+ 3	+ 3	+ 3	+ 3	+ 3
—	—	—	—	—	—	—
3	2	3	3	7	6	7	3	3
4	5	4	3	1	1	0	0	3	2
2	1	3	3	5	2	3	3	6	5
—	—	—	—	—	—	—	—	—	—
9	8	2	3	5	4	3	7	6	3
0	2	2	3	0	0	3	1	0	3
1	0	5	2	2	3	4	1	2	2
—	—	—	—	—	—	—	—	—	—

Oral problems on + 3 combinations—(1) There were 9 birds on the one rose bush, 3 birds on the other rose bush; how many birds on both bushes? (2) Paid $6 for a raincoat, $3 for a hat; how much more did the coat cost than the hat? (3) Tom ate 7 cherries and then ate 3 more; how many has he eaten? (4) How much money will pay for 3 balloons at 2 cents apiece? (5) There were 4 birds on a telegraph wire, 3 more came; how many were there then? (6) John had 6 cents and lost 3 cents on his way to school; how much money had he left? (7) There are 5 boys with 100 per cent. in arithmetic in 1A, 3 boys with 100 per cent. in 1B; how many boys in the two classes were perfect? (8) Peter had 9 firecrackers in his pocket, 3 went off; how many had he left? (9) I paid 8 cents for a pencil box and 3 cents for a blank book; how much did I spend? (10) Tell a story about 6 + 3.

10	9	8	7	6	5	4	3	2	1
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
—	—	—	—	—	—	—	—	—	—

10	9	8	7	6	5	4	3	2
— 2	— 2	— 2	— 2	— 2	— 2	— 2	— 2	— 2
—	—	—	—	—	—	—	—	—

11	12	13	14	15	16	17	18	19	20
— 1	— 1	— 1	— 1	— 1	— 2	— 2	— 2	— 2	— 2
—	—	—	—	—	—	—	—	—	—

10	11	12	13	14	15	16	17	18	19	20
— 3	— 3	— 3	— 3	— 3	— 3	— 3	— 3	— 3	— 3	— 3
—	—	—	—	—	—	—	—	—	—	—

Oral problems on —1, — 2, — 3 combinations—(1) Fred bought a quart of milk; on the way home he spilled 1 pint. How much milk had he when he reached home? (2) In our yard were 5 cats; along came the dog and 2 cats ran away. How many stayed in the yard? (3) Frank had 10 pigeons; two of them died. How many pigeons has he now? (4) In a car were 15 people; soon 3 got out. How many people were in the car then? (5) George is 7 yrs. old; his brother is 3 yrs. younger. How old is his brother? (6) Mary had 11 cents in her purse; she took out 3 cents to buy a book. How much money was still in her purse? (7) Frank read 20 pages in his book yesterday and 3 pages less today. How many pages did he read today? (8) There were 19 words on the board; Rose erased 3 of them.

How many words were still on the board? (9) A man had 8 horses; he sold 2 of them. How many horses has he now? (10) There were 20 boys in a class; two boys were late. How many boys were early?

Drill Table in Subtraction: For Rapid Oral Work. (*Figure XI.*)

Figure XI

A	B	C
1-1	5-1	7-2
11-2	7-1	6-3
6-1	3-1	3-2
10-3	9-2	9-3
2-1	4-2	5-3
9-1	12-3	8-3
4-1	8-2	10-1
8-1	3-3	7-3
2-2	4-3	5-2
11-3	6-2	10-2

Fig XIV

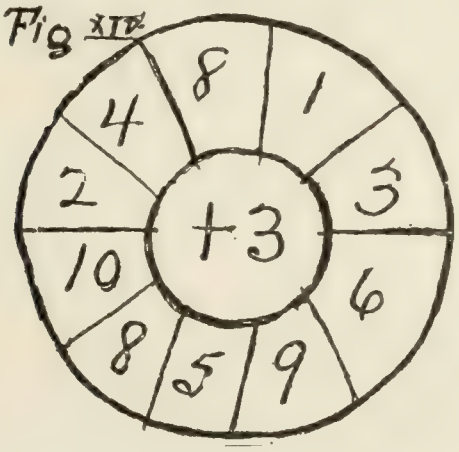

Fig XV

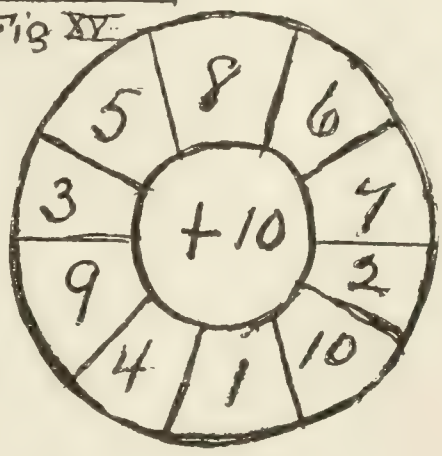

Figure XII

12	15	18	10	13	17	14	11	16	19

Figure XIII

2	9	1	6	5	8	3	7	10	4

Further Drill in Subtraction.:

(1) Subtract 1 from each of the above numbers. (2) Subtract 2 from each of the above numbers. (3) Subtract 3 from each of the above numbers.

(1) What number must be added to each of the numbers in the row above to make 10? (2) To make 11, 12, 13, 14 — — — — — to 20?

Drill Exercises.—The following exercises are designed for rapid work in addition and subtraction:

Measurements—cent, five-cent piece, dime, dollar.—(1) Put 5 cents in a pile; put beside it a 5 cent piece; compare the two in value. (2) Put 10 cents in a pile; put beside it a dime; compare the two in value. (3) A dime is equal in value to 10 cents. (4) Two 5 cent pieces are equal in value to a dime. (5) How many five cent pieces are equal in value to a dime? (6) One 5 cent piece is what part of a dime? (7) John had 5 cents and paid 3 cents for a ball. How many cents did he have left? (8) How many 2-cent stamps can you buy with a dime? (9) How many cents in a dollar? (10) How many dimes in a dollar?

Measurements—Foot—Walk along the front of the room from wall to wall. How many steps do you take? Do all of you take the same number of steps? Now walk along the sides of the room from back to front. How many steps do you take? Record on the blackboard the number of steps taken by each boy.

Now take a foot ruler. Measure all of the foot rules. Are they the same size? Using your foot rule, find how wide the room is. Find how long it is. How wide is your desk? How long is it? How high is it? We use a rule 1 foot long to find the length of large things such as the length of the room, length of a hall, or the width of a room, desk, window, etc.

First Week.

Monday—Oral—Reading Numbers—1 to 50. Column drill from blackboard, as: (1) 13, 43, 12, 9, 32. (2) 47, 30, 25, 7, 21. (3) 50, 31, 16, 27, 19. (4) 13, 41, 26, 35, 10. (5) 49, 23, 37, 18, 40.

Addition—10 + 1, 1 + 10.

Counting—With objects, 1 to 10. Without objects, 1 to 25.

Subtraction—1 — 1—(1) Jack had 1 apple; ate 1; how many had he left? (2) John had 1 cent in his pocket and lost 1 cent; how much money had he left? (3) I had 1 candy; gave 1 to my mother; how many had I left?

Written—Writing Numbers—10, 11, 12.

Addition—At blackboard or seats:

2	1	5	2	3	1	1	2
1	3	2	2	1	2	1	2
2	2	1	1	1	2	2	2
—	—	—	—	—	—	—	—

Tuesday—Reading Numbers—To 50. Column drill from board, as: (1) 33, 10, 13, 14, 15. (2) 8, 48, 31, 26, 22. (3) 49, 32, 17, 28, 20. (4) 14, 42, 27, 36, 11. (5) 46, 24, 38, 19, 39.

Addition—10 + 2, 2 + 10.

Counting—With objects, 1 to 10. Without objects, 1 to 25.

Subtraction—1 — 1, 2 — 1.—(1) Alice had 2 roses; 1 faded; how many were left? (2) John was awakened at 2 o'clock; his brother Sam rose 1 hour earlier; when did Sam get up? (3) I had 2 dollars in my bank; spent 1 dollar; how much money had I left?

Written—Writing Numbers—13, 14, 15.

Addition—

1	1	1	4	5	1	1	3
3	2	3	1	1	5	7	1
2	1	1	1	1	2	1	1
—	—	—	—	—	—	—	—

Subtraction—

2	12	22	21
— 1	— 11	— 11	— 11
—	—	—	—

Wednesday—Reading Numbers—To 50.

Recognition drill from cards.

Addition—10 + 3, 3 + 10.

Counting—With objects, 1 to 12. Without objects, 1 to 25.

Subtraction—1 — 1, 2 — 1.—(1) Had $2 in my bank; spent $1 for a pair of gloves; how much money was left? (2) There were 2 boys absent in the morning; only 1 in the afternoon; what happened? (3) One little sparrow playing all alone; he got lost; how many were left?

Written—Writing Numbers—16, 17, 18.

Addition—

1	1	1	1	1	1	1	1
1	2	4	2	6	2	2	7
2	1	2	5	2	6	7	2
1	1	—	—	—	—	—	—
—	—						

Subtraction—

21	12	22	22
— 10	— 11	— 10	— 11
—	—	—	—

Thursday—Reading Numbers—To 50.

Recognition drill from cards.

Addition—10 + 4, 4 + 10.

Counting—With objects, 1 to 12. Without objects, 1 to 25.

Subtraction—1 — 1, 2 — 1.

Written—Writing Numbers—19, 20.

Addition—

2	4	2	1	2	2	2	2	27	25	13	12
3	0	3	2	2	1	1	7	12	12	34	36
1	1	2	6	4	6	5	1	—	—	—	—
—	—	—	—	—	—	—	—				

Subtraction—

22	12	21	22
— 10	— 10	— 11	— 11

Friday—Reading Numbers—To 50, as: (1) 2, 3, 7, 9, 10. (2) 19, 12, 15, 11, 17. (3) 28, 23, 27, 21, 26. (4) 31, 39, 37, 30, 40. (5) 46, 45, 42, 48, 50. Addition—Review: $10 + 1 = ?$ $10 + 2 = ?$ $10 + 3 = ?$ $10 + 4 = ?$ $1 + 10 = ?$ $2 + 10 = ?$ $4 + 10 = ?$

(1) Ten boys in one row and 4 in another. How many boys in both rows? (2) John has 2 cents; he earns 10 cents. How much money had he then? (3) Place 10 splints on your desk and add 3 more. How many then? (4) A bag of peanuts cost 10 cents and a stick of candy cost 1 cent. How much do they both cost? (5) There were 10 boys in the orchestra and 2 more were added. How many in it now? (6) Tell a story about 10 and 4. (7) How many cents will it take to buy a 10 cent ball and a 4 cent top? (8) I had 1 cent in my pocket. I sold 10 papers at 1 cent each. How much money had I then? (9) Tell a story about 3 and 10. (10) John bought a kite for 10 cents, and a string for 2 cents. How much did he pay for both?

Counting—With objects, 1 to 12; without objects, 1 to 25.

Subtraction—$1 - 1$, $2 - 1$.

Written—Writing numbers—Dictate 12, 13, 17, 19, 11, 14, 16, 18, 15, 20.

Addition—$32 + 13$; $22 + 24$; $12 + 25$; $32 + 23$; $62 + 27$.

Substraction—$12 - 11$; $21 - 10$; $22 - 11$.

Friday's written work could be used as a test of what has been learned during the week.

Second Week.

Oral—Monday—Reading numbers—To 60. (1) Blackboard—51, 52, 53, 54, 55, 56, 57, 58, 59, 60.

Addition—$10 + 5$; $10 + 6$; $5 + 10$; $6 + 10$.

Counting—With objects, 1 to 15; without objects, 1 to 30.

Subtraction—Develop $3 - 1$. (1) A man has 3 sheep; one is white, the others are black. How many are black? (2) One boy in a row of 3 is disobedient. How many boys in that row are good? (3) John had 3 marbles. He lost 1 in a game. How many had he left?

Written—Writing numbers—20, 21, 22, 23.

Addition—$25 + 21$; $43 + 12$; $67 + 21$; $58 + 21$; $25 + 12$; $34 + 22$; $87 + 12$; $56 + 12$; $10 + 74$; $10 + 33$; $10 + 42$; $10 + 55$; $10 + 86$.

Subtraction—$21 - 11$; $22 - 11$; $23 - 11$; $32 - 11$; $33 - 11$.

Tuesday—Reading numbers—To 60. (a) Recognition drill from cards.

Addition—$10 + 7$; $10 + 8$; $7 + 10$; $8 + 10$.

Counting—With objects, 1 to 15; without objects, 1 to 30. By 10's to 100.

Subtraction—Drill on -1, -2, -3. (Have individual pupils tell stories about -1, -2, -3.)

Written—Writing numbers—20, 21, 22, 23, 24, 25.

Addition—$10 + 86$; $10 + 57$; $78 + 10$; $56 + 10$; $10 + 77$; $22 + 20$; $12 + 13$; $20 + 10$; $12 + 22$; $21 + 20$; $20 + 22$; $12 + 23$; $20 + 29$.

Subtraction—$23 - 11$; $13 - 11$; $32 - 11$; $12 - 11$; $22 - 11$.

Wednesday—Reading number to 60.

Addition—$10 + 9$; $9 + 10$.

Counting—Same as on Tuesday.

Subtraction—Develop 4 — 1.—(1) There were 4 pictures on the wall; if 1 fell down, how many were there still on the wall? (2) There were 4 sparrows on a tree; the cat frightened 1 of them away; how many stayed in the tree? (3) Frank had 4 pigeons; one of them died; how many pigeons has he now? (4) In our yard were 4 cats; along came the dog and 1 cat ran away; how many stayed in the yard? (5) On our board there were 4 examples; Vincent erased 1 of them; how many did he leave on the board?

Written—Writing Numbers—25, 26, 27, 28.

Addition—21 + 12; 20 + 22; 24 + 22; 11 + 22; 15 + 22; 21 + 27; 12 + 21; 79 + 10; 85 + 10; 10 + 78; 10 + 86; 67 + 10.

Subtraction—34 — 11; 44 — 11; 23 — 11; 33 — 11; 24 — 11.

Thursday—Reading Numbers—To 60.

Addition—10 + 10.

Counting—Same as on Tuesday.

Subtraction—3 — 1; 4 — 1. (Problems.)

Written—Writing Numbers—28, 29, 30.

Addition—32 + 23; 53 + 24; 36 + 10; 32 + 13; 36 + 12.

Subtraction—24 — 11; 43 — 11; 32 — 11; 41 — 11; 34 — 11.

Friday—Reading Numbers—1 to 60.—(1) Recognition drill from cards. (2) Recognition drill from board. (3) Special drill on the following: 50, 57, 53, 59, 60, 51, 58, 55, 54, 56.

Addition—Review—10 + 5; 10 + 6; 10 + 7; 10 + 8; 10 + 9. 5 + 10; 6 + 10; 7 + 10; 8 + 10; 9 + 10; 10 + 10.

(1) William had 10 peanuts and 5 walnuts; how many nuts had he? (2) Mary had 6 cents in her purse; her father gave her 10 more; how much money had she then? (3) Willie has a piece of rope 10 feet long; Frank has one 7 feet longer; how long is Frank's rope? (4) John is 8 years old; his brother, Sam, is 10 years older; how old is Sam? (5) I saw 10 children on a sleigh and 9 on skates; how many children did I see? (6) There are 10 boys and 10 girls in a class; how many pupils are there altogether? (7) Tell a story about 7 + 10. (8) Mr. Levine had 10 horses and bought 5 more; how many horses had he then? (9) There were 10 boys in a class; 9 more were added; how many in the class now? (10) Tell a story about 10 and 10.

Written—Writing Numbers—Dictate 20, 25, 23, 29, 30, 27, 22, 26 28, 24.

Addition—Test—

16	12	15	25	10
32	35	22	72	29
—	—	—	—	—

Subtraction—Test—43 — 11; 32 — 11; 24 — 11; 23 — 11; 44 — 11.

Third Week.

Monday—Oral—Reading Numbers—To 75.—(1) Blackboard, 60, 61, 62, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74, 75.

Addition—2 + 5; 2 + 6.

Counting—Same as second week.

Subtraction—Review 3 — 1; 4 — 1. Develop 5 — 1. (Problems on 5 — 1.)

Measurements—Cent, 5-cent piece.

Written—Writing Numbers—30, 31, 32.

Addition—2, 1, 3, 1; 1, 2, 1, 4; 1, 2, 2, 2; 2, 1, 1, 6; 1, 0, 2, 3; 1, 2, 1, 3.

Subtraction—34 — 11; 54 — 11; 43 — 11; 54 — 11; 52 — 11.

Tuesday—Reading Numbers—To 75.

Addition—2 + 7.

Counting—Same as second week.

Subtraction—Drill on 3 — 1; 4 — 1; 5 — 1.

Measurements—Cent, five-cent piece.

Written—Writing Numbers—33, 34, 35.

Addition—32 + 25; 42 + 16; 47 + 22; 67 + 22; 12 + 57.

Subtraction—42 — 11; 35 — 11; 53 — 11; 44 — 11; 43 — 11.

Wednesday—Reading Numbers—To 75.

Addition—2 + 8 = ? 2 + 9 = ?

Counting—10's to 100; 2 to 20.

Subtraction—Drill on 3 — 1; 4 — 1; 5 — 1.

Written—Writing Numbers—35, 36, 37.

Addition—23, 11; 67, 22; 85, 22; 93, 21; 76, 22.

Subtraction—42 — 11; 32 — 10; 35 — 11; 45 — 10; 55 — 11.

Thursday—Reading Numbers—To 75.

Addition—2 + 10.

Counting—10 to 100; 2's to 20.

Subtraction—3 — 1; 4 — 1; 5 — 1.

Written—Writing Numbers—38, 39, 40.

Addition—24 + 12; 85 + 22; 22 + 54; 37 + 12; 76 + 22.

Subtraction—24 — 11; 54 — 11; 43 — 11; 32 — 11; 51 — 11.

Friday—Reading Numbers—To 75.

(1) Recognition drill from (1) cards; (2) board. (Figures XII, XIII, XIV and XV.)

Addition—Review—(1) James paid 2 cents for a book and 5 cents for a pencil box; how much did he pay for both? (2) There were 6 birds on the top branch of a tree; 2 more flew on; how many were there then? (3) Lucy is 8 years old; her brother is 2 years older; how old is her brother? (4) There were 7 boys absent in the morning; 2 more in the afternoon; how many absent then? (5) Tom ate 2 cherries and later ate 10 more; how many has he eaten? (6) We read 9 pages in one reader and 2 pages in another; how many pages did we read? (7) Mary paid 2 cents for a stamp and 5 cents for a postal; how much money did she spend? (8) There were 8 birds on a telegraph wire; 2 more came; how many were there then? (9) I have a dime and a five-cent piece; how many cents is that? (10) Paid $7 for a suit, $2 for a hat; how much did they both cost?

Counting—1 to 15, with objects. 1 to 30, without objects. 10 to 100. 2 to 20.

Subtraction—3 — 1; 4 — 1; 5 — 1. (Review.)

Written—Writing Numbers—Dictate (1) 30, 37, 35, 39, 31. (2) 33, 32, 36, 40, 34.

Addition—45 + 12; 95 + 22; 86 + 22; 21 + 58; 23 + 72.
Subtraction—45 — 11; 54 — 11; 43 — 11; 24 — 11; 55 — 11.

FOURTH WEEK.

Monday—Oral—Reading Numbers—To 80.
Addition—3 + 1; 3 + 2; 3 + 3.
Counting—10's to 100.—(1) Tie up 10 bundles of splints, 10 in a bundle, and have children count by 10's. (2) Arrange groups of children, 10 in a group, and count by 10's. (3) Have 10 children stand and count fingers by 10.
Subtraction—6 — 1.
Measurement—Dime—(1) Review cent, five-cent piece.
Written—Writing Numbers—40 to 50.
Addition—1 + 3 + 3; 2 + 3 + 3; 3 + 1 + 2; 3 + 2 + 1; 3 + 0 + 3.
Subtraction—65 — 11; 56 — 11; 36 — 11; 62 — 11; 46 — 11.
Tuesday—Reading Numbers—To 80.
Addition—3 + 1; 3 + 2; 3 + 3.
Counting— 2's to 20.
Subtraction—6 — 1.
Measurements—Dime, cent, five-cent piece.
Written—Writing Numbers—40 to 50.
Addition— 20 + 56; 23 + 13; 30 + 33; 33 +13; 32 + 35.
Subtraction—42 — 11; 34 — 11; 55 — 11; 16 — 11; 65 — 11.
Wednesday—Reading Numbers—To 80.
Addition—3 + 1; 3 + 2; 3 + 3. (1) Review + 1, + 2 combinations.
Counting—10's to 100; 2 to 20.
Subtraction—4 — 1; 5 — 1; 6 — 1.
Measurements—Same.
Written—Writing Numbers—40 to 50.
Addition—33 + 43; 32 + 37; 23 + 63; 32 + 34; 83 + 23.
Subtraction—65 — 11; 54 — 11; 43 — 11; 32 — 11; 21 — 11.
Thursday—Reading Numbers—To 80.
Addition—Same.
Counting—Same.
Subtraction—Drill on 2 — 1; 3 — 1; 4 — 1; 5 — 1; 6 — 1.
Measurements—Same.
Friday—Recognition of the following numbers: 70, 73, 75, 78, 79, 80.
Addition—Visualize and give answer: 2 + 3 + 3; 3 + 0 + 3; 1 + 3 + 3; 3 + 1 + 2; 3 + 2 + 1.
Counting—10 to 100; 2 to 20.
Subtraction—Card drill—2 — 1; 3 — 1; 4 — 1; 5 — 1; 6 — 1.
Measurements—Problems on cent, five-cent and dime.
Written—Writing Numbers—40 to 50 from memory.
Addition—Test—37 + 32; 35 + 32; 63 + 23; 53 + 13; 34 + 32.
Subtraction—23 — 11; 34 — 11; 45 — 11; 56 — 11; 65 — 11.

FIFTH WEEK.

Monday—Oral—Reading Numbers—To 90.

Addition—3 + 4. Review 3 + 3.
Counting—Same as fourth week.
Subtraction—7 — 1.
Measurements—Dime, dollar.
Written—Writing Numbers—50 to 60.
Addition— 4 + 3; 3 + 1 + 3; 3 + 2 + 2; 4 + 1 + 2; 3 + 0 + 4; 4 + 2 + 1.
Subtraction—7 — 1; 76 — 11; 65 — 11; 57 — 11; 74 — 11.
Tuesday—Reading Numbers—To 90.
Addition—3 + 4. (1) Review other combinations taught.
Subtraction—7 — 1.
Measurements—Problems on dime, dollar. (1) Count 10 dimes.
Written—Writing Numbers—50 to 60.
Addition—54 + 13; 30 + 45; 35 + 32; 36 + 42; 30 + 37.
Subtraction—Blackboard drill—67 — 11; 45 — 11; 53 — 11; 37 — 11; 62 — 11; 57 — 11; 64 — 11; 45 — 11; 76 — 11.
Wednesday—Reading Numbers—To 90.
Addition—Combination drill from cards.
Subtraction— 8 — 1.
Measurements—Same.
Written—Writing Numbers—50 to 60.
Addition—43 + 30; 24 + 73; 46 + 32; 14 + 53; 37 + 40.
Subtraction—Same as on Tuesday.
Thursday—Reading Numbers—To 90.
Addition—Drill from cards.
Subtraction—Board drill—5 — 1; 6 — 1; 7 — 1; 8 — 1.
Measurements—Same.
Written—Addition—34 + 23; 33 + 34; 32 + 43; 36 + 32.
Subtraction—67 — 11; 78 — 11.
Friday—Reading Numbers—To 90.
Addition— 3+ 2; 4 + 2; 5 + 2; 6 + 2; 7 + 2; 8 + 2; 9 + 2; 10 + 2; 3 + 3; 3 + 4.
Subtraction—2 — 1; 3 — 1; 4 — 1; 5 — 1; 6 — 1; 7 — 1; 8 — 1.
Written—Dictate 50, 52, 55, 58, 60.
Addition—47 + 32; 46 + 31; 33 + 42; 45 + 32; 32 + 47.
Subtraction— 26 — 11; 63 — 11; 56 — 11; 65 — 11; 78 — 11.

Sixth Week.

Monday—Oral—Reading Numbers—To 100.
Addition—5 + 3. Review 4 + 3; 3 + 3.
Counting—By 5's to 20. (1) Review 1 to 20; 2 to 20.
Subtraction—9 — 1.
Written—Writing Numbers—60 to 75.
Addition—5 + 1 + 2; 3 + 3 + 2; 2 + 1 + 5; 3 + 1 + 4; 3 + 1 + 2 + 2; 3 + 2 + 2 + 1.
Subtraction—79 — 11; 95 — 11; 98 — 11: 89 — 11; 90 — 10.
Tuesday—Reading Numbers—To 100.
Addition—Drill on 3 + 3; 4 + 3; 5 + 3.

Counting—5's to 20.

Subtraction—Drill on; 3 — 1; 4 — 1; 5 — 1; 6 — 1; 7 — 1; 8 — 1; 9 — 1.

Written—Writing Numbers—60 to 75.

Addition—33 + 35; 53 + 31; 52 + 14; 25 + 43; 37 + 52.

Subtraction—Same as on Monday.

Wednesday—Reading Numbers—To 100.

Addition—Combination drill from cards.

Counting—With objects, 1 to 20; without objects, 1 to 30; 10 to 100; 2 to 20; 5 to 20.

Subtraction—Same as on Tuesday.

Written—Writing Numbers—60 to 75.

Addition—32 + 36; 45 + 32; 54 + 33; 53 + 34; 35 + 33.

Subtraction—67 — 11; 78 — 11; 89 — 11.

Thursday—Reading Numbers—To 100.

Addition—Board drill on: 3 + 3; 4 + 3; 5 + 3.

Counting—Same as on Wednesday.

Subtraction—Board drill; 3 — 1; 4 — 1; 5 — 1; 6 — 1; 7 — 1; 8 — 1; 9 — 1.

Written—Writing Numbers—60 to 75.

Addition—23 + 64; 75 + 23; 43 + 32; 36 + 50; 45 + 23.

Subtraction—85 — 11; 92 — 11; 79 — 11.

Friday—Reading Numbers—To 100—(1) Drill from blackboard. (2) Drill from cards. (3) Drill from chart.

Addition—3 + 3; 3 + 4; 4 + 3; 3 + 5; 5 + 3. (1) Drill from cards. (2) Drill from board.

Counting—Count 1 to 20, with objects. Count 1 to 50, without objects. 10 to 100; 2 to 20; 5 to 20.

Subtraction—Drill on —1 combination.

Written—Writing Numbers—Dictate as test: 63, 65, 62, 67, 69, 70, 73, 64, 71, 75.

Addition—Test: 32 + 36; 54 + 33; 35 + 33; 75 + 23; 45 + 23.

Subtraction—69 — 11; 58 — 11; 74 — 11; 95 — 11; 53 — 11; 98 — 11.

Type Examples for First Year—Second Half—(1) Louise had 15 cents; she spent 3 cents for an orange. How much had she left? (2) There were 13 sheets of paper in a box; Edith used 3 of them. How many were left? (3) Out of 17 jars of preserves, 2 were broken. Number of jars left? (4) The class had 10 words in a spelling lesson; John misspelled 2. How many did he spell correctly? (5) There were 13 trees on a street. How many were left after 2 were cut down? (6) A bat and a ball cost 20 cents; the bat cost 10 cents. What did the ball cost? (7) Russell bought a wheel for $15 and sold it for $12. How much did he lose? (8) Mr. Jones sold 9 of his 10 sheep. How many had he left? (9) Farmer Brown had 12 cows; he sold 3 of them. How many has he left? (10) A grocer had 14 barrels of potatoes in the morning and 3 at night. How many barrels had he sold? (11) Eugene had 7 peaches and gave his sister 2 of them. How many peaches had he left? (12) How many cents must I put with 4 cents to make 7 cents?

(13) Mabel had a dime and spent 2 cents for a postal card and 1 cent for a stamp. How many cents had she left? (14) Emma is 9 years old and her brother is 3 years older. How old is her brother? (15) Some boys are coasting on a hill; there are 5 boys coming down and 3 boys going up. How many boys are there in all? (16) If 7 of these boys have sleds, how many do not have sleds? (17) John found four eggs in 1 nest, 3 eggs in another, and 2 in another. How many eggs did he find? (18) Henry gave 10 cents for a ball, 5 cents for a bat, and 3 cents for some tape. How many cents did he give for all? (19) Grace is 20 years old; her brother is 2 years younger. How old is her brother? (20) There are 17 pupils in the A class and 20 pupils in the B class. How many more pupils in the B class? (21) William had 10 cents and spent 7 cents for a kite and 2 cents for cord. How many cents had he left? (22) There are 12 months in a year; if you go to school 10 months, how many months' vacation do you have? (23) A class contains 19 pupils. If 3 are absent, how many are present? (24) Frank had 10 cents and paid 5 cents for a trolley ride. How many cents did he have left? (25) Robert has a nickel and a dime. How much money has he? (26) If I spend 8 cents for pencils, how much change will I receive from a dime? (27) Charles had 4 picture cards; his mother gave him 3 more. How many had he then? (28) Viola spent 2 weeks in the country at Christmas time and 10 weeks during the summer. How many weeks did she spend there on both visits? (29) Robert had 6 cents; he bought as many balls at 3 cents as he could. How many did he buy? (30) Jennie is now 12 years old. How old was she 3 years ago?

Arithmetic—2A

First Week.

Review work of previous grade.

Reading Numbers—7, 14, 36, 41, 92; 11, 1, 25, 31, 7; 6, 53, 66, 7, 36.

Addition—4 + 4. Give each child 8 splints. Let them place 4 at the left of the desk and 4 at the right, then push them together and say: Four and four are eight. Write on the board 4 + 4 = 8. Study.

Subtraction—Reverse the process. Place the 8 sticks together in the middle of the desk. Tell them to take away four. How many left? Four. Study 4 from 8 leaves 4.

Counting—3's to 6. Use splints. Tell them to lay down 3, then 3 more, and say, 3, 6. Let several children do this.

Measurements—Inch. Give each child an inch square and a sheet of paper. Tell them to make dots at the corners, and join them by drawing lines. What does this form? "A square." Next let them make dots at the two upper corners only, and join them with a line. Tell them that this line is an inch long. Have them say after you, one inch.

Problems—Four boys skating and 4 on the sliding pond. How many? Four girls on 1 bench, 4 on the next. How many? Four green apples and 4 red ones. How many? A square is an inch long on each side. How many inches around the square? If a boy walks all around the block, how many corners does he pass? How many streets or avenues does he walk on?

SECOND WEEK.

Monday—Reading Numbers—6, 86, 9, 99, 100; 5, 23, 123, 149, 57; 37, 110, 10, 76, 89.

Addition—5 + 4. Nine splints, five at the left and four at the right. Bring together. Write 5 + 4 = 9.

Study—Subtraction—9 — 4 = 5. Reverse the process. Nine splints in the middle of the desk. Take away four. Write and study 4 from 9 leaves 5.

Counting—3, 6, 9, 12. Drop three splints on the desk, then three more, and three more, until there are twelve, saying at the same time, 3, 6, 9, 12. Let several children do this.

Measurements—Inch. Drill on inch, by dictating lines of varied lengths.

Comparison—Number of objects. Place 5 children in one corner of the room; 4 in the other. (Teach the word group.) Train them to say: This group of children is larger than this group of children. Place groups of objects about the room, or if this be impossible, draw pictures of them. As for example, a group of oranges and a group of 4 oranges. Let them point out and say, "This group of oranges is larger than this group." Do the same with 9 dots and 4 dots; with 7 crosses and 3 crosses, etc. Let them say, "This group is larger than this, or has more in it." Then reverse, pointing to the smaller group first, and saying, "This group is smaller than the other, or has less in it." (Occasionally have two groups exactly alike, to see what they will say.)

Written Work—Writing Numbers—11, 99, 147, 55, 153, 76; 25, 149, 115, 38, 137, 9.

Addition—2, 5, 2; 3, 6, 0; 4, 5, 0; 3, 5, 0.

Subtraction—38 — 15; 29 — 14; 37 — 21; 48 — 24.

Tuesday—Reading Numbers—99, 125, 93, 114, 7; 38, 141, 110, 36, 104.

Addition—5 + 4 } 5 children on one side of the room; 4 on the other. Have them march together to form 9.

Subtraction—9 — 4 } Let the children say 5 and 4 are 9. Let 4 march back. How many left? Teach the children to say 4 from 9 leaves 5. Let them come together again (5 + 4 = 9). This time let 5 march back. Say 5 from 9 leaves 4.

Counting—Let 12 children march in rows of 3 each; let the other children say 3, 6, 9, 12.

Comparison—Size of objects. Draw on the board a large square and a small one. Pointing to the large one, let them say, "This square is larger than that"; pointing to the small one, "This square is smaller than that." Take a tall boy and a short one. Have them use the words, taller, shorter.

Problems—Five boys playing horse; 4 girls playing school. How many children? I had 9 cents and bought 4 penny apples. How much did I have left? If I use my inch square 5 times in measuring a line, how long will the line be? If, a second time, I use it 4 times in measuring, how long will the second line be? What would be the length of the two lines together?

Written Work—Writing Numbers: 2, 12, 122, 47, 5, 39; 4, 24, 150, 14, 130, 77; 65, 100, 4, 38, 251, 66.

Addition—4, 2, 2; 5, 4, 0; 5, 1, 2.

Subtraction—24 — 14; 34 — 11; 25 — 13.

Wednesday—Reading Numbers: 149, 56, 32, 137, 125; 23, 41, 114, 101, 91.

Addition—5 + 4. Let the children make an illustration (with colored crayon, if desired) of 5 and 4 are 9: XXXXX Then write 5 + 4 = 9.
XXXX

Subtraction—9 — 4. Make a picture of 9 objects, 5 above and 4 below. Cross out the 4. XXXXX Write 9 — 4 = 5.
XXXX

Counting—3, 6, 9, 12.

Illustrate.	Write.
• • •	3
• • •	6
• • •	9
• • •	12

Comparison—Using the same pictures and illustrations as on Monday and Tuesday; drill on comparisons. (1) As to number of objects. (2) As to size of objects.

Problems—5 robins and 4 bluejays. How many birds? The bluejays flew away. What was left? 5 bent pins in a cushion; 4 straight ones. How many? If I throw away the bent ones, what will I have left?

Written Work—Writing Numbers: 36, 115, 92, 125, 7; 47, 125, 36, 114, 6.

Addition—2, 4, 1; 2, 4, 4; 4, 4, 1; 3, 4, 2.

Subtraction—47 — 31; 58 —42; 66 — 35; 88 — 43.

Thursday—Reading Numbers: 6, 21, 145, 67, 138; 128, 99, 47, 115, 46.

Addition—5 + 4. Let each child make a drill card for himself, using

$$\begin{array}{r} 5 \\ +\ 4 \\ \hline \end{array}$$

Subtraction—A similar card for subtraction

$$\begin{array}{r} 9 \\ -\ 4 \\ \hline \end{array}$$

Study 5 and 4 are 9; 4 from 9 leaves 5.

Counting—Add 9 and 12 to the counting chart.

• • •	3
• • •	6
• • •	9
• • •	12

Measurements and Comparisons. } Inch. Lines of varied lenths.

Tell the children to measure a 2-inch line; then draw it. Next a 4-inch line. Have them compare them as they did the objects and groups of objects. Lead them to use the words longer and shorter.

Problems—5 birds in a tree; 4 on the ground. How many? The 4 on

the ground flew away. How many were left? I had 9 cents. I gave 1 cent to each of my 4 brothers. How many had I left for myself? I bought 9 eggs, 4 were cracked. How many in good condition? There were 9 boys in 1 group; 4 in another. How many more in the first than in the second?

Written Work—Writing Numbers: 19, 86, 125, 140, 87; 3, 103, 13, 33, 145.

Addition: 2, 5, 2; 3, 3, 3; 5, 4, 0.

Subtraction: 39 — 15; 48 — 14; 23 —12.

Friday—Reading Numbers: 11, 125, 44, 141, 35; 24, 124, 35, 135, 14.

Addition } "Hear" the tables.
Subtraction }

Go round the class.

5 and 4? 4 and 4? 5 and 3? 4 and 5? 0 and 3? 6 and 2? 4 from 9? 5 from 9? 3 from 8? 4 from 8? etc. Put this on the board. Let the children copy and fill in: 6 and — = 8. 4 and — = 8. — and 4 = 9. 3 and — = 8. 2 and 6 = ? 3 + 4 = ?

Counting—Hear 2's to 20; backward and forward, and 3's forward to 12.

Measurements—Let the children draw from dictation lines of given length.

Problems—There were 4 rows of children marching 3 in a row. How many children altogether? 3 went home. How many left? 3 sat down to their work. How many left? 3 went to the B. B. How many left? 3 stood up for their spelling lesson. How many still marching? Mary has 5 cents; I have 4. Which of us has more? How much more? Each of us bought 4 sticks of candy. How many did Mary have left? How many did I? If we had both put our money in the bank, how much would we have haved?

Written Work—Writing Numbers: 24, 149, 36, 115; 35, 125, 69, 205; 103, 101, 5, 24.

Addition—3, 4, 2; 2, 4, 4; 1, 4, 3; 2, 3, 3.

Subtraction: 88 — 44; 69 — 44; 26 — 15.

Third Week.

Reading Numbers—1 to 200. Monday: 11, 105, 111, 66, 106, 6, 115, 15, 34, 9.

Tuesday: 21, 149, 150, 45, 105, 5, 195, 43, 103, 7.

Wednesday: 35, 191, 36, 109, 119, 37, 151, 192, 86, 101.

Thursday: 33, 133, 96, 196, 47, 115, 45, 126, 41.

Friday: 86, 186, 50, 5, 185, 190, 7, 16, 199.

Addition—6 + 4.

Subtraction—10 — 4.

Monday—Use splints for addition and subtraction, as in first and second weeks.

Tuesday—Let the children make an illustration (with crayons) of 6 + 4 = 10 and 10 — 4 = 6.

Wednesday—Use the children themselves, as an illustration, having them march forward or backward, according to direction.

Thursday—Let each child make a drill card, illustrating $\begin{array}{r} 6 \\ +\ 4 \\ \hline \end{array}$ and one illustrating $\begin{array}{r} 10 \\ -\ 4 \\ \hline \end{array}$ Study.

Friday—"Hear" (around the class) all the tables learned.

Counting—3's to 18.

Monday—Let the children use splints, placing 3 at a time, until 18 has been reached. Transfer in same manner, using numeral frame.

Tuesday—Let the children illustrate 3's to 18 by placing 3 dots in a row, then another 3 and another until 18 has been reached. Let them also write:

3 • • •
6 • • •
9 • • •
12 • • •
15 • • •
18 • • •

Wednesday—Let the children march in 3's until there are 18 marching. Let the other children count.

Thursday—Add 15, 18 to the counting chart.

Friday—"Hear" as many children as possible; repeat the 3's as far as 18. Also 2's backward and forward.

Fractions—Monday—Give the children each a strip of paper to fold. First in halves, telling them to get the corners exactly even. Then show them how to fold each half in half. Open the paper. Ask them to count the parts. Tell them that because there are 4, they are called fourths or quarters.

Tuesday—Draw a circle on the board (call it a pie). Divide it in halves; then fourths. Ask them how many fourths in a pie.

Wednesday—Give out paper circles; let the children fold them in halves; then fourths. Open them out; cut. Fit the pieces together again to make a circle.

Thursday—Show them how to make an oblong, 4 inches by 1 inch, by using the inch square 4 times for the top, once for the sides, and 4 times for the bottom.

Connect the top and bottom dots, vertically, as well as horizontally. Call this a loaf of bread; ask them how many halves in it; how many fourths?

Friday—Problems involving halves and fourths.

Problems—Monday: 6 examinations right and 4 wrong. How many did the teacher give? A little girl had ten pennies saved. In opening her

bank, she lost 4. How many had she left? 6 girls and 4 boys in a class. How many children? 10 little girls on the spelling line; 4 had to sit down because they missed. How many were left standing?

Tuesday—A farmer planted apple trees, 3 in a row. He had 6 rows. How many trees? 3 were blown down by a storm. How many left standing? 6 bean stalks and 4 potato plants. How many plants? 10 geraniums in a window, 4 had white blossoms; the rest had pink. How many had pink blossoms?

Wednesday—Some boys were playing soldiers. The captain placed them 3 in a row. When he had 2 rows in place, how many soldiers had he? 3 rows? 4 rows? 5 rows? 6 rows? 10 milk bottles; 4 had tops; the rest had none. How many had none?

Thursday—6 bright boys and 4 lazy ones. How many altogether? Ned spent 6 cents for oranges and 4 cents for lead pencils. How many did he spend altogether? There were 10 eggs in the dish. Mother took 4 to make a cake. How many left?

Friday—If a loaf of bread costs 10 cents, what will half a loaf cost? What will I pay for the half of an 8 cent pie? If mamma has 8 cents to divide among the children, and there are 4 of them, how many will each one get? If there are 4 apples and 4 children, what will each one get?

Written Work—Writing Numbers—Monday: 4, 104, 25, 111, 64, 109, 73, 81, 5.

Tuesday: 16, 116, 54, 37, 137, 99, 199, 41, 108.

Wednesday: 7, 117, 42, 180, 7, 190, 66, 105, 9.

Thursday: 66, 150, 61, 119, 45, 110, 36, 199, 4.

Friday: 5, 105, 10, 110, 35, 131, 141, 56, 9.

Addition: 6, 3, 1; 4, 3, 2; 2, 4, 4; 4, 3, 2; 4, 4, 1; 4, 4, 2; 4, 4, 0; 4, 1, 2; 3, 3, 4; 3, 4, 3; 4, 3, 3; 4, 2, 2; 1, 5, 4; 6, 0, 4; 1, 4, 5.

Subtraction—38 — 25; 69 — 44; 79 — 31; 48 — 21; 67 — 34; 39 — 21; 89 — 54; 76 — 31; 88 — 32; 96 — 34; 87 — 25; 75 — 14; 77 — 36; 66 — 21; 47 — 13.

Fourth Week.

Reading Numbers—From 1 to 250.

Addition—7 + 4 }
Subtraction—11 — 4 } See Third Week.
Counting—3's to 24 }

Measurement—Foot. Give each child a twelve-inch ruler (if possible) and a one-inch square. Let him place one edge of the square against each inch in turn until he discovers that it takes twelve of these inch measurements to be as long as the "ruler." Give him the word foot.

Problems—Similar to those given for Third Week.

Written Work—Writing Numbers—1 to 250.

Addition:

Monday.		Tuesday.		Wednesday.		Thursday.		Friday.	
4	2	3	3	5	1	4	2	1	1
3	3	4	4	3	5	4	4	5	3
4	5	4	5	2	5	3	4	5	6

Subtraction:

Monday.		Tuesday.		Wednesday.		Thursday.		Friday.	
99	43	37	66	75	87	96	83	76	83
— 12	— 10	— 25	— 14	— 32	— 15	— 11	— 12	— 16	— 50

Fifth Week.

Reading Numbers—From 1 to 250.

Addition—8 + 4 }
Subtraction—12 — 4 } See Third Week.
Counting—3's to 24 }

Measurements—Quart, pint. Let one child fill a quart measure from a pitcher of water. Place two pint measures near; fill them from the quart measure. How much did it take? All. What do we call this measure? A quart measure. What do we call the smaller measure? A pint. How many pints does it take to fill a quart measure? What part of a quart is a pint? Drill the idea of pint and quart by means of drawings on the board, because in the "pouring" lesson, the children will be more interested in watching the action performed, than in learning the fact which the action illustrates. Comparisons as in second week, using larger numbers.

Problems—Similar to those given for Third Week, including the use of 8 + 4, and questions on pint and quart.

Written Work—Writing Numbers—1 to 250.

Addition—Numbers of 2 orders: 32, 12, 42; 32, 43, 23; 14, 12, 13; 25, 32, 12; 11, 45, 42; 81, 25, 23; 84, 42, 2; 81, 34, 14; 43, 43, 32; 43, 43, 43.

Subtraction: 48 — 26; 59 — 37; 46 — 24; 88 — 43; 86 — 30; 97 — 53; 65 — 33; 65 — 20; 78 — 13; 68 — 24.

Sixth Week.

Reading Numbers—1 to 300.

Addition—9 + 4 }
Subtraction—13 — 4 } See Third Week.
Counting—3's to 27 }

Measurements—Quart, gallon. Use a method similar to that for quart and pint in the Fifth Week. Have one pouring lesson; after that, drawings on the board: a quart measure divided in half, a pint measure undivided, and a gallon measure divided in 4 parts. Toward the end of the week let the children copy these.

Problems, as in Third Week.

Written Work—Writing Numbers—1 to 300. Addition, as in Fifth Week. Subtraction, as in Fifth Week.

Seventh Week.

Reading Numbers—1 to 350.

Addition—1 + 5; 2 + 5; 3 + 5; 4 + 5; 5 + 5.

Use splints first. Study the combinations both ways: 1 and 5 are 6; 5 and 1 are 6. Let the children make drill cards.

Subtraction—10 — 5.

Counting—3's to 30.

Fractions—Halves of single objects. Cut an apple in half. Show the children the 2 pieces. Lay the two pieces together again. Let the children draw several objects, such as a pie, a loaf of bread, a ruler. Divide each neatly in half. Discover by questioning and by occasionally using other parts, such as fourths and eighths, whether the children really know that a half is one of 2 parts.

Problems—As in Third Week, with the addition of those involving the new tables, and the use of pint, quart and gallon.

Addition—As in Fifth Week.

Subtraction—As in Fifth Week.

Eighth Week.

Reading Numbers—1 to 400.

Addition:

1	2	3	4	5
+ 6	+ 6	+ 6	+ 6	+ 6
7	8	9	10	11

Use splints. Study both ways. Make drill cards.

Subtraction—11 — 5.

Counting—3's — 30.

Measurement—Drill on the relation of pint, quart, and gallon.

Fractions—Halves of numbers. Let the children place a number of splints on the desk, as per example 10. Next let them pick them up and place them by 1's in opposite piles until all have been used. Tell them to count the number in each pile. Ask them what they have learned. Write one half of 10 is 5. Do similar work with other numbers.

Problems—As in third week. Also some including the use of the new tables.

Written Work—Writing numbers, 1 to 400.

Addition, as in fifth week.

Subtraction, as in fifth week.

Ninth Week. C

Reading Numbers—1 to 450.

Addition—7 + 5 } Taken up in a manner similar to the work
Subtraction—12 — 5 } done in the third week.

Counting—4's to 12.

Comparison—Draw an oblong on the board; then another one twice as long; then similar ones in an upright position. Let the children compare them. Have them use the expressions twice as long, twice as high. Then, pointing to the smaller one, train them to say: No. 1 is half the size of No. 2, etc.

Fractions—Halves—Work similar to that of the eighth week, using different numbers.

Problems—Similar to those of the eighth week.

Written work—Writing Numbers—1 to 450.

Addition—Using three numbers of 3 orders.

Monday.		Tuesday.		Wednesday.		Thursday.		Friday.	
431	551	422	411	423	624	501	442	531	533
356	226	554	454	623	333	563	205	402	463
101	322	122	234	143	232	234	642	245	302
423	344	435	565	689	779	578	569	478	678
—201	—302	—321	—404	—323	—634	—124	—425	—355	—134

TENTH WEEK.

Reading Numbers—1 to 500.

Addition, 8 + 5, 9 + 5.
Subtraction, 13 — 5, 14 — 5. } As in previous weeks.

Counting—4's to 16.

Comparisons
Fractions } Work similar to that of the ninth week.
Problems.

Written Work—Writing Numbers—1 to 500.

Addition.

Monday.		Tuesday.		Wednesday.		Thursday.	Friday.	
522	213	334	223	522	233	555	513	233
144	243	421	422	345	414	434	444	342
532	603	343	143	331	442	400	542	423

Subtraction.

493	500	980	299	267	389	456	386	498
—201	—300	—640	—154	—156	—201	—154	—255	—356

Arithmetic—2B

FIRST WEEK.

Reading Numbers—1 to 500.

Roman Numbers—This subject is worked out in detail on page 23 of the December, 1912, MONOGRAPHS.

Addition—Drill on 45 combinations. Decimation Tables—1's. By decimation tables is meant the taking of a combination up to 100, as follows (read downward, not across):

0	1	2	3	4	5	6	7	8	9
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
1	2	3	4	5	6	7	8	9	10

10	11	12	13	14	15	16	17	18	19
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
11	12	13	14	15	16	17	18	19	20

20	21	22	23	24	25	26	27	28	29
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
21	22	23	24	25	26	27	28	29	30

30	31	32	33	34	35	36	37	38	39
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
31	32	33	34	35	36	37	38	39	40

40	41	42	43	44	45	46	47	48	49
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
41	42	43	44	45	46	47	48	49	50

50	51	52	53	54	55	56	57	58	59
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
51	52	53	54	55	56	57	58	59	60

60	61	62	63	64	65	66	67	68	69
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
61	62	63	64	65	66	67	68	69	70

70	71	72	73	74	75	76	77	78	79
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
71	72	73	74	75	76	77	78	79	80

80	81	82	83	84	85	86	87	88	89
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
81	82	83	84	85	86	87	88	89	90

90	91	92	93	94	95	96	97	98	99
+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1	+ 1
91	92	93	94	95	96	97	98	99	100

By taking 2 of these combinations each day, the ground will be covered in a week.

Subtraction Decimation Tables—1's:

1	2	3	4	5	6	7	8	9
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
0	1	2	3	4	5	6	7	8

11	12	13	14	15	16	17	18	19
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
10	11	12	13	14	15	16	17	18
21	22	23	24	25	26	27	28	29
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
20	21	22	23	24	25	26	27	28
31	32	33	34	35	36	37	38	39
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
30	31	32	33	34	35	36	37	38
41	42	43	44	45	46	47	48	49
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
40	41	42	43	44	45	46	47	48
51	52	53	54	55	56	57	58	59
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
50	51	52	53	54	55	56	57	58
61	62	63	64	65	66	67	68	69
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
60	61	62	63	64	65	66	67	68
71	72	73	74	75	76	77	78	79
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
70	71	72	73	74	75	76	77	78
81	82	83	84	85	86	87	88	89
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
80	81	82	83	84	85	86	87	88
91	92	93	94	95	96	97	98	99
— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1	— 1
90	91	92	93	94	95	96	97	98

Measurement—Inch—Let the children draw, from dictation, lines of various length, as, a 1-inch line, a 3-inch line, a 6-inch line, etc.

Measurement—Hour, day, week—See p. 28, December, 1912, MONOGRAPHS. Also p. 24 for Problems.

Comparison—Let the children compare the lines drawn in the measurement lesson. They will probably say the 6-inch line is longer than the 1-inch line. Let them discover, if possible, how many times a 1-inch square can be measured against a 6-inch line. Train them to say: The 6-inch line is 6 times as long as the 1-inch line. In a similar manner, a 2-inch line is half of a 4-inch line, etc.

Problems—I had 24 cents and my mother gave me 1 cent more; how much had I? There were 49 boys in our class; on Monday morning a new boy came in; how many then? My father had 13 cows; he bought a new one; how many? My brother is 1 year older than I am; I am 14. How old is my brother? My sister had 26 cents in her bank; she took 1 out; how much left? My brother had $69 saved; he spent $1; how much left? My father went away at 5 o'clock; he said he would be back in 3 hours; at what time should we expect him? The doctor came at 2 o'clock; he said he would be back in 12 hours; at what time did he return?

Written Work—Writing numbers—1 to 500.

Addition (teach carrying)—Show them that (because 9 is the largest figure that occupies only one place) any answer greater than 9 must have its left-hand figure carried to the next column.

Monday.		Tuesday.		Wednesday.		Thursday.		Friday.	
533	524	353	362	248	436	234	256	258	346
767	496	386	778	776	957	225	575	276	478
676	488	219	868	786	677	595	316	476	986

Subtraction—The Austrian method is described on page 26 of the December MONOGRAPHS.—390 — 254; 470 — 345; 581 — 575; 422 — 364; 352 — 276; 590 — 346; 569 — 456; 579 — 468; 490 — 267; 480 — 378.

SECOND WEEK.

Reading Numbers—1 to 500. Roman numbers—I and II.

Addition—The 45 combinations, Decimation Tables, 2's. See first week.

Subtraction—Decimation Tables, 2's.

Counting—2's to 100.—Use the numeral frame. Let the children write out the counting, in decades, as follows:

0	10	20	30	40	50	60	70	80	90	
2	12	22	32	42	52	62	72	82	92	
4	14	24	34	44	54	64	74	84	94	
6	16	26	36	46	56	66	76	86	96	
8	18	28	38	48	58	68	78	88	98	100

Fractions—Halves, fourths—Let the children draw 2 circles; cut them out, fold one in ½'s; cut; fold each half in half; cut. Lay the 4 pieces on the other circle. Children, if I cut a pie in two equal pieces, what have I? Halves. If I cut it into four equal pieces, what have I? Fourths or quarters? In the same way draw an oblong; cut it out; call it a loaf of bread; divide it in halves, fourths.

Measurement—Inch.

Comparison—Lines of varied lengths—Let the children measure lines of varied lengths; draw, then compare them.

Problems—42 children in a class; 2 new scholars; how many? My father had 25 hens; he bought 2 new ones; how many? I had 97 marbles in my box; if I buy 2 more, how many will I have? I had 90% in arithmetic; Mary had 2% more than I; how many had Mary? My mother is 26, and my father 2 years older; how old is my father?

Go round the class—9 and 9? 6 and 8? 7 and 7? 6 and 7? 9 and 6? 6 and 9? 2 and 8? 12 and 8? 22 and 8? etc. Also subtraction—1 from 100? 2 from 68? 2 from 40? 6 from 15? 7 from 15? 8 from 17? etc. Tell the children to fill in the blanks in the following: $8 + \quad = 17$; $\quad + 9 = 15$; $8 + \quad = 16$; $9 + \quad = 18$; $7 + 9 = \quad$; $9 + 3 = \quad$; $8 + \quad = 12$; $7 + 8 = \quad$; $6 + \quad = 13$; $\quad + 8 = 14$.

Written Work—Writing numbers, 1 to 500.

Addition—Add 264, 144, 466; 554, 677,727; 346, 336, 346; 343, 267, 456; 454, 387, 216; 234, 548, 156; 445, 676, 689; 224, 367, 422; 334, 254, 115; 335, 255, 316.

Subtraction—522 —466, 891 — 767, 810 — 656, 444 — 387, 436 — 298, 384 — 298, 822 — 578, 129 — 68, 246 — 128, 578 — 279.

Third Week.

Reading numbers, 1 to 500. Roman numbers, I, II, III.

Addition, Subtraction } Decimation Tables, with 3's.

Counting—2's and 5's to 100—Write the 5's in decades: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. 5, 15, 25, 35, 45, 55, 65, 75, 85, 95. Have the children repeat the counting; also 2's.

Problems—On Wednesday umbrellas were 87 cents each. On the next day they were 3 cents dearer; how much did they cost the next day? 54 girls and 3 boys in a class; how many children? 3 hens and 25 chickens; how many fowl? I had 67 cents in my bank; my father gave me 3 more; how much had I? I spent 2; how much left? There were 43 children in our class; 3 got promoted; how many still in the class? Then 2 new scholars came in; how many then? 9 good apples and 6 rotten ones; how many? 8 oak trees and 8 maples; how many? 7 boys and 8 girls; how many children? 6 cows, 7 horses and 8 sheep; how many animals? 8 tops, 9 whips, 3 dolls; how many toys? Bobby had 10 cents; he gave 2 to his sister; then he spent 3; how many had he left?

Written Work—Writing numbers, 1 to 500.

Addition—(1) 188, 377, 496; 348, 198, 486. (2) 144, 378, 288; 435, 469, 366. (3) 225, 497, 389; 436, 196, 386. (4) 465, 257, 498; 457, 577, 476. (5) 287, 566, 369; 247, 374, 578.

Subtraction—(1) 374 — 287, 266 — 179. (2) 533 — 286, 552 — 376. (3) 444 — 198, 879 — 538. (4) 693 — 478, 478 — 268. (5) 208 — 88, 496 — 87.

Fourth Week.

Reading numbers, 1 to 600. Roman numbers, I, II, III.

Subtraction, Addition } Decimation Tables—Review 1's, 2's, 3's.

To drill the tables, use this device; make a large circle on the board; place the numbers from 0 to 9 around it. In the middle place + 1.

9
1 0
2 3
+ 1
4 5
7 6
8

Point to each number in turn, and go very quickly around the class. Have quick answers or none. If a child hesitates, let the next child answer. Next place a 1 in front of each of the numbers around the circle, so that it looks like this:

19
11 10
12 13
+ 1
14 15
16 17
18

Go round the class again. Next change each 1 to a 2, and go round once more.

29
23 20
21 26
22 + 1
24 25
26 27
28

This can go on up to 99 and 1, if desired.

Subtraction in the same manner.

The same work may be done with 2's and 3's.

Counting 1's backward. Let the children write it:

100	90	80	70	60	50	40	30	20	10
99	89	79	69	59	49	39	29	19	9
98	88	78	68	58	48	38	28	18	8
97	87	77	67	57	47	37	27	17	7
96	86	76	66	56	46	36	26	16	6
95	85	75	65	55	45	35	25	15	5
94	84	74	64	54	44	34	24	14	4
93	83	73	63	53	43	33	23	13	3
92	82	72	62	52	42	32	22	12	2
91	81	71	61	51	41	31	21	11	1

Problems—Similar to those of the third week.

Written Work—Writing numbers, 1 to 600.

Addition—(1) 543, 434, 543; 584, 64, 134; 576, 394, 75. (2) 495, 354, 216; 457, 89, 298; 476, 577, 589. (3) 595, 448, 586; 475, 587, 497; 486, 99, 426. (4) 398, 494, 194; 588, 495, 314; 369, 357, 243. (5) 198, 265, 445; 454, 374, 593; 598, 496, 585.

Subtraction—(1) 799 — 487, 699 — 558, 369 — 257. (2) 442 — 238, 591 — 369, 360 — 348. (3) 554 — 489, 535 — 299, 316 — 299. (4) 484 — 398, 535 — 498, 532 — 67. (5) 588 — 480, 499 — 290, 577 — 270.

Fifth Week.

Reading numbers to 700. Roman numbers, I, II, III, IV.

Addition, Subtraction } Decimation Tables, 1's, 2's, 3's.

Review of 45 combinations. Make drill cards:

7	9	8	9	8	9	
+ 4	+ 5	+ 6	+ 8	+ 2	+ 5	etc.

Subtraction—14 — 7, 12 — 6, 10 — 4, 9 — 3, 15 — 6, 19 — 3, 11 — 7.

24	24	24	17	10	13	22
— 2	— 3	— 1	— 2	— 6	— 7	— 3
4	0	2	1	2	1	0
— 7	— 3	— 7	— 6	— 9	— 8	— 6

Train the children to say 7 from 4 I cannot take; 3 from 0 I cannot take, etc. (for the cards in parenthesis).

Measurements—Pint, quart, gallon, hour, day, week.

Problems—If a quart of milk costs 6 cents, what will a pint cost? A pint of honey costs 20 cents; cost of a quart? At 3 cents a quart, what will a gallon of oil cost? A half gallon? A boy was paid 3 cents an hour for picking beans; how much did he earn in 3 hours? If your father is paid $2 a day, what will he earn in 2 days? In 3 days? In 4 days? In 5 days? If you begin on Sunday and put 5 cents in the bank every day, how much will you have by the next Sunday? How many days in 1 week? In 2 weeks? In 3 weeks? (Use objects.)

Written Work—Write numbers to 700.

Addition, Subtraction } Examples similar to those of the fourth week.

Sixth Week.

Reading numbers to 700. Roman numbers, I, II, III, IV, V.

Addition, Subtraction } Review of 45 combinations.

Decimation Tables, 1's, 2's, 3's.

Reviewed in the same manner as in the fourth week.

Counting by 3's to 100—1's backward.

Measurement—Cent, five-cent piece, dime, quarter dollar, half dollar, dollar. This subject has been thoroughly worked out in the December, 1912, Monographs. See Measurement in the 2A article.

Problems—"If you save 1 penny a day," John's father said to him, "I will give you a dime as soon as you have enough pennies"; how many days did he have to wait? James had a dime and his brother had two nickels; which had more? Harry bought five 5-cent oranges; how much did he pay for them? Mary has five dimes; how much money is that? Robert had a half dollar; he gave his brother half of it; how much did he give his brother? how much did he keep for himself? If I save up 4 quarters, how much money have I?

Written Work—Writing numbers 1 to 700.

Addition—(1) 636, 577, 487; 547, 376, 589. (2) 374, 568, 598; 337, 556, 495. (3) 555, 378, 789; 536, 667, 597. (4) 577, 479, 686; 568, 377, 757. (5) 487, 558, 447; 565, 467, 677.

Subtraction—(1) 469 — 234, 698 — 276. (2) 513 — 499, 472 — 389. (3) 680 — 569, 690 — 458. (4) 500 — 457, 400 — 348. (5) 200 — 159, 600 — 267.

Seventh Week.

Reading Numbers 1 to 700. Roman numbers, I to VI.

Addition, Subtraction } Decimation Tables, 4's.

Counting—2's backwards.

Compare number of objects, as 7 dots with 2 dots; 10 apples with 6 apples; 14 cents with 7 cents; size of objects, relative height of a man and a boy; of a large object and a small one; of a cow and a calf; of an elephant and a horse; of a whale and an ordinary fish.

Fractions—Halves and fourths—If a yard of muslin costs 8 cents, what will a half yard cost? a quarter yard? If a gallon of oil costs 12 cents, what will ½ gallon cost? a quart?

Problems—If a quart of tomatoes costs 8 cents, what will a quart and a pint cost? I spent 29 cents for grapes and 3 for apples; how much for all? 27 girls in a class and 8 boys; how many children? 22 chickens and 8 ducks; how many altogether? The 8 ducks were killed; what was left? 27 trees in a row; 5 were maples, the rest oaks; how many oaks?

Written Work—Writing numbers 1 to 700.

Addition, Subtraction } Similar to that of the sixth week.

Eighth Week.

Reading numbers, 1 to 700. Roman numbers, I, II, III, IV, V, VI.

Addition, Subtraction } Decimation Tables, 5's.

Counting—3's backward.

Fractions—Eighths developed objectively. (See page 25, December Monographs.)

Problems—I had 45 cents in my bank and my father gave me a nickel; how much had I then? 5 eggs on the shelf and 5 in the bowl; how many? I paid 7 cents for oranges and 5 cents for grapes; how much did I spend? 19 cents for pads and 5 for pencils; how much money spent? I had 25 cents and I spent 5; how much left? There were 30 soldiers marching; all but 5 had guns; how many had guns?

Written Work—Writing numbers, 1 to 700.

Addition, Subtraction } Similar to that of the sixth week.

Ninth Week.

Reading numbers to 800. Roman numbers, I to VII.

Addition, Subtraction } Decimation Tables, 4's and 5's.

Measurements—Pint, quart, gallon.

Fractions—½'s, ¼'s, ⅛'s.

Problems—6 birds in a tree; ½ of them flew away; how many flew away? how many left? 12 apples on the table; ¼ of them were green, the rest red; how many red? If oil is 10 cents a gallon, what will 3 gallons cost? 4 gallons? etc. A pint of cream cost 20 cents; what will ½ pint cost? I had 45 cents last Sunday; I spent 5 cents; how much had I left?

Written Work—Writing numbers, 1 to 800.

Addition—(1) 656, 678, 786; 588, 799, 449. (2) 374, 487, 217; 784, 666, 554. (3) 687, 779, 586; 489, 878, 697. (4) 638, 677, 687; 537, 497,686.

Subtraction—(1) 809 — 787, 982 — 48. (2) 908 — 596, 809 — 787. (3) 807 — 767, 848 — 697. (4) 900 — 27, 800 — 97.

Tenth Week.

Reading numbers to 900. Roman numbers I to VIII.

Addition, Subtraction } Decimation Tables, 4's and 5's.

Measurements—Halves, fourths, eighths.

Time by Clock—Hour.

Problems—9 little chicks in the coop, 8 running around; how many? 8 roosters and 7 hens; how many? 9 cents in one pocket, 6 in another; how much? 17 boys and 8 girls; how many children? etc.

Drill on Tables—Put this on the board:

7	6	8	9	8	5	6
9	8	9	6	9	6	8
6	9	7	8	2	8	8
8	5	8	9	8	7	9
6	7	9	7	7	8	8
5	8	6	9	6	9	2
9	2	5	8	5	8	6
8	3	7	7	3	2	7
2	9	8	6	2	6	5

Let each child add a column. When he misses, let him find the answer to the combination by using objects. Let the whole class study with him. Then begin again at the top of the column.

Written Work—Writing numbers to 900.

Addition—(1) 388, 599, 899; 577, 977, 886. (2) 897, 489, 897; 766, 699, 776. (3) 877, 878, 686; 499, 907, 886. (4) 676, 877, 689; 897, 788, 799. (5) 584, 578, 898; 855, 898, 687.

Subtraction—(1) 900 — 287, 800 — 496. (2) 875 — 767, 955 — 658. (3) 852 — 786, 876 — 856. (4) 885 — 676 994 — 78. (5) 198 — 23, 786 — 47.

Typical Examples—3A

Oral—First Month.

Reading Numbers—Reading numbers to 5000.

Pupils have read numbers to 1000 in 2B and should be familiar with the meaning of units, tens, hundreds and thousands. It is essential to give rapid drill in this work each day in order that pupils may gain accuracy and speed through practice.

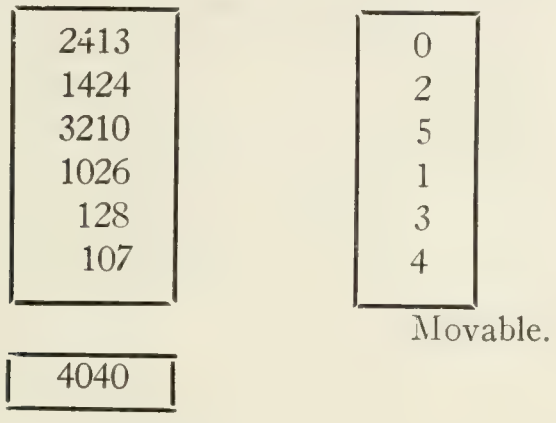

Fig. 1.

The chart illustrated in Fig. 1 may be used as an aid in the reading of numbers and, in addition, vertical slips containing other numbers may be placed over the columns to vary the reading, and horizontal slips may be placed so as to change the combinations for adding. Children make many mistakes in reading numbers which contain naughts, so it might be well to make one slip on which most of the figures are naughts.

In addition to this routine drill the teacher should present many new and fresh examples every day until children can read any number below 5000 rapidly and correctly.

Drill and explanation should go hand in hand at first. (1) 1000 is read ——; 348 is read ——. (2) Read—4621, 1564, 2172, 1600, 3145. (3) 1080, 902, 4129, 2843, 1902.

The various combinations which may be made of the figures between 1000 and 5000 are many. Select a page of history or geography containing a large number of dates and ask children to read out the numbers.

The following samples are quoted from Smith's Primary Arithmetic: (1) "Columbus discovered America in 1492. George Washington was born in 1732. Henry Hudson discovered the Hudson River in 1609. The Pilgrims landed at Plymouth 1620. Boston was founded in 1630. The first American newspaper was printed in 1704." (2) "The Declaration of Independence was signed in 1776. George Washington became President 1789. The Chicago fire was in 1871."

Roman Numerals.—The children became familiar with the Roman numerals through XII in 2B and have probably associated them more or less closely with the clock face and the months of the year; now give them some book having the chapter numbered with the Roman letters and have them read for practice.

(1) They should be associated in serial order first by counting off the

chapters. (2) Next give them simple problems as: (3) What chapter follows XV? (4) When you have read XII chapters, how many have you read? (5) How many more chapters will you have to read in a book containing XX chapters, after you have read XVI chapters?

A chart displaying Roman numerals from I to XX arranged in two columns should be shown. It may be referred to for drill in reading and writing numbers with Roman numerals.

Addition—Numbers from 1 to 6 to numbers from 1 to 100 in series increasing by 10.

The teacher who will construct such charts as are illustrated in Figs. 1 and 3, and make also at least 4 vertical and 5 horizontal movable slips for each will find herself at once supplied with a large number of examples suitable for drill in oral addition. If some of those numbers are too large for the beginnings of this work blank slips may be placed over them so as to eliminate them for the time being.

1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1

Fig. 2.

The above combinations and others of same kind placed upon large charts will furnish means of rapid drill in addition every day. Single combination should also be placed upon "sight cards." See October, 1912, MONOGRAPHS under 3A. When the entire class have mastered the easier combinations they may be removed from the pack and more time be given to the difficult ones. The same cards may later be used in multiplication drills.

The addition to numbers from 1 to 100 in series increasing by 10 require such examples as the following: (1) Add 1 to 1, 11, 21, 31, 41, 51, etc. (2) Add 2 to 2, 12, 22, 32, 42, 52, etc. (3) Add 3 to 3, 13, 23, 33, 43, 53, 63, 73, 83, 93. (4) Add 4 to 4, 14, 24, 34, 44, 54, etc. (5) Add 5 to 5, 15, 25, 35, 45, 55, 65, etc. (6) Add 6 to 6, 16, 26, 36, 46, 56, 66 etc. (7) To the series ending in 1 should also be added 2, 3, 4, 5, 6. (8) To the series ending in 2, 3, 4, 5 and 6, should also be added 1, 3, 4, 5, 6.

Easy problems should also be given in abundance. (1) 8 pencils and 2 pencils are how many pencils? (2) Louis has 4 apples in one basket and 5 in another. How many apples has he? (3) If John has 6 marbles and wins 6 more how many marbles has he? (4) A line is 9 inches long. How long will it be after 4 inches have been added? (5) How many pictures in a room where 6 have been dusted and 5 have not? (6) There are 9 blue paints and 5 yellow paints in a box. How many paints in the box? (7) Charles paid 7 cents for one book and 6 cents for another. Find cost of the two books. (8) Mr. Brown sold 6 yds. of silk and 9 yds. of trimming. How many yards of material sold? (9) Grace had 8 spelling words correct one day and 5 the next. How many words correct?

(Many similar examples can be hastily made up by increasing the number, to which another is added in series of tens, e. g., in the first example the 8 might be replaced by 18, 28, 38, 48, 58, 68, 78, 88, 98.)

Counting—Review counting by 5's, 2's, 4's, 3's, to 100. By 6's to 100. Devices suitable for drill work in counting may be found in the MONOGRAPHS of December, 1910.

Beginning with 0 count by 5's to 25, reverse; by 2's to 100, by 3's to 18, reverse; by 3's to 99, by 2's to 100, reverse; by 4's to 40, reverse; by 5's to 100, by 4's to 100, by 6's to 24, by 6's to 96, reverse.

Subtraction—Review the decimation tables of the second year. Many of the examples given in the oral addition may be reversed and used for subtraction. The "drill charts" and "sight cards" suggested for rapid addition may be used for subtraction. See Figs. 4 to 14.

(1)—16 — 1; 26 — 2; 36 — 3; 46 — 4; 56 — 5. (2) 24 — 5; 26 — 3; 22 — 4; 23 — 1; 21 — 2. (3) 41 — 4; 44 — 2; 46 — 3; 45 — 1; 43 — 5. (4) 66 — 5; 64 — 4; 62 — 5; 61 — 3; 65 — 4. (5) 93 — 4; 92 — 5; 94 — 3; 96 — 46; 91 — 4. (6) Man had $16. Spent $2. Left? (7) The grocer sold 3 dozen eggs from a 41 dozen lot. How many dozen eggs left? (8) A bicyclist had a distance of 24 miles to go. How many miles must he ride after he has ridden 5 miles? (9) What is the difference between 22 tons of coal and 4 tons of coal? (10) 5 yards of cloth were sold from a piece containing 43 yards. How many yards were left in piece? (11) John earns $.96, spends $.05. Saves? (12) Mr. Black walked 12 miles. Mr. Smith walked 5 miles. Mr. Smith walked how many miles more than Mr. Black? (13) A plot of ground is 16 feet long and 5 feet wide. How much longer is it than wide? (14) Mr. Reid had 46 sheep. Wolves killed 3. How many were left? (15) From a cistern holding 62 gallons of water, 5 gallons were drawn off. How many gallons remained in the cistern?

Multiplication—Review the counting tables of 2's and 3's. "Sight cards" and "drill charts," as shown in Figs. 4 to 14 should be used for giving rapid drill. Other useful devices for drill in the multiplication tables are given in the MONOGRAPH, December, 1910, pages 27, 34, 35.

Multiply—1, 2, 3 to 12 by 2; by 3. (2) $9 \times 3 = (?)$; $— \times 7 = 21$; $8 \times — = 16$; $4 \times 3 = (?)$; $— \times 6 = 12$; etc. (3) Multiply 11 and 12 by 2; 11 and 12 by 3. (4) $8 \times — = 16$; $9 \times 3 = —$; $7 \times 2 = —$; $— \times 3 = 18$; $— \times 2 = 14$. (5) At 2 cents per ounce, how much will it cost to send a package weighing 6 ounces? (6) A cow gives 8 quarts of milk twice a day. How many quarts will she give each day? (7) A farmer sold 3 pecks of onions at $.12 per peck. How much money did he receive? (8) A dozen apples were given to each of 3 girls. How many apples have they altogether? (9) There are 3 sets of books on a shelf. Each set contains 9 books. How many books on the shelf?

Division—Correlate with counting and multiplication tables of 2's and 3's. (1) In 6 there are — twos; in 9, 15, 21, there are — threes, etc. (2) Divide 12, 18, 24, 16 and 20 by 2. (3) Divide 15, 24, 18, 36 and 27 by 3. (4) Name two numbers whose product is 8, 20, 16, 9, 24, 30. (5) $6 \div 2 = —$; $— \div 3 = 9$; $18 \div 3 = —$; $24 \div — = 12$; $— \div 2 = 9$. (6) When 3 bunches of grapes cost 18 cents, what is the cost of one bunch? (7) Find the cost of one pair of shoes if 3 pairs cost $15. (8) It takes 3 quarts of milk to make one pound of butter. How many pounds of butter in 36 quarts

of milk? (9) Mary sold 3 quarts of berries for 12 cents. What did she receive for each quart? (10) 14 half oranges will equal how many whole oranges? (11) How many pennies will there be for each boy if 24 cents are divided between two boys?

Measurements—Dozen. See the exercises given under this heading in the MONOGRAPHS, October, 1912, Grade 3A.

There are 12 units in one dozen. There are — units in two dozen. There are — units in three dozen.

The foregoing should be associated with 2 times 12 and 3×12, which are in the multiplication tables for this month. Later when other tables are learned similar exercises may be carried further.

(1) How many apples in one dozen? (2) How many apples in ½ dozen? (3) How many apples in 3 dozen? (4) How many apples in 2 dozen? (5) How many months in one year? (6) How many months in 2 years? (7) How many months in 3 years? (8) How many months in ½ year? (9) 6 months are what part of a year? (10) 66 marbles and 6 marbles are— dozen marbles? (11) 1 dozen balls are 6 more than — balls? (12) John had a dozen balls and gave away half of them. How many did he have left? (13) 9 balls from a dozen balls leaves (?) (14) 6 balls from a dozen balls leaves (?) (15) 8 balls from a dozen balls leaves (?)

Fractions—Review halves, fourths, eighths. Teach thirds and sixths. For objective illustrations to aid in teaching these fractions see the MONOGRAPHS, October, 1912, pages 11, 28, 36. (1) How many halves in one apple? (2) $\frac{1}{2} + \frac{1}{2} = ?$. (3) How many half notes equal 1 whole note in music? (5) One dollar and one half dollar are how much money? (6) John had a stick of candy and gave away ½ of it. How much has he left? (7) How many quarters in a dollar? (8) How many quarter notes equal a whole note in music? (9) $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = ?$ (10) ½ is how many fourths? (11) Frank divided his apple into 4 equal parts and gave away three of them. What part of an apple did he keep? (12) If a whole note has four beats, how many beats has a quarter note? Two quarter notes? Three quarter notes? A whole note and a uarter? A half note and a quarter? A half note and two quarters? (13) Into how many eighths can I divide a pie? An orange? A line? Anything? (14) A working day is 8 hours. How much time does a man lose who stays away from work an eighth of a day? (15) $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = ?$ (16) $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = ?$ (17) How many hours in a day? (24) How many hours in ⅛ of a day? (18) There are 16 ounces in a pound. How many ounces in ⅛ of a pound? (19) Find ⅛ of 8, 16, 24. (20) ½ is — fourths. ¼ is — eighths. ½ is — eighths.

Thirds and sixths are new to this grade and need to be developed with concrete material before these typical examples are presented. (1) How many thirds are equal to a whole thing? (2) How many sixths in a whole thing? (3) ½ = how many sixths? (4) Find ⅙ of 6, 12, 18. (5) Find ⅓ of 6, 12, 18, 24, 30, 36. (6) What must you add to ⅙ to make ⅚? (7) Will had 24 marbles; he lost ⅓ of them. How many did he keep? How many did he lose? (8) Susie spent ⅓ of her money and gave away ⅓ of it.

What part had she left? If she had 12 cents to start with, how many cents had she left? (9) Alice had a yard of ribbon. She cut off 1/6. How much has she left? (10) At $18 a cord find cost of 1/3 of a cord of wood.

Written.

Writing Numbers—The numbers already given under "Reading Numbers" may also be used to advantage for practice in learning to write numbers. Further practice may be gained by pupils in writing down the numbers given in their problems and work in the four fundamental operations. Pupils learn in 2B to write all numbers through 1000. In the first month of 3A they will write numbers from 1000 to 5000. It is well to begin with simple exercises as: (1) Write these numbers: One thousand four hundred and twenty-five; two thousand six hundred forty; four thousand three hundred eighty-four; three thousand five hundred; four thousand nine hundred ninety-nine.

Pupils should also be asked to write in words such numbers as: (1) 4000, 3246, 1728, 2464, 4235, 2647, etc. Paragraphs should be read to pupils in dictation lessons which require them to use figures with which they are familiar; e. g., a certain tract of land in the West is fenced into fields of the following sizes: 100 acres, 2,112 acres, 4,246 acres, 1,212 acres, etc. Dollars and cents may be written separately.

Addition—Many of the examples given under "Reading Numbers" and "Writing Numbers" may be used for practice in addition. Care should be taken not to use those whose sum is too large, e. g., the limit for this month is 5,000. Add (1) 469, 298, 152, 350; (2) 932, 158, 750, 325; (3) 2,145, 1,296, 2,016, 120; (4) 2,563, 1,387, 954, 602, 96; (5) $21.60, $24.45, $3.28, $4.32, $1.27; (6) $8.00, $5.75, $2.36, $40.17, $6.32. (7) A bicyclist rode 1,234 miles the first year, 897 miles the second year, 768 miles the third year, 629 miles the fourth year, 500 miles the fifth year. How many miles did he ride in all? (8) A railroad corporation had built 490 freight cars in 1898, 672 cars in 1899, 1,296 cars in 1900, 1,728 cars in 1901, 2,340 cars in 1902. How many cars had been built for it by 1903? (9) Mr. Williams divided his property as follows: 1st son, $2,628; 1st daughter, $1,724; 2nd son, $926; 2nd daughter, $844; favorite child, $5,649. How large was his estate? (10) The corporation expenses for a certain town for six months were as follows: $1,296 for the first month, $2,727 for the second month, $1,423 for the third month, $1,097 for the fourth month, $2,635 for the fifth month, $1,144 for the sixth month. What was the total expenses for six months? (11) In Mr. May's orchard there are 158 cherry trees, 469 plum tree, 2,350 apple trees, 152 peach trees, 1,067 pear trees, 20 apricot trees. How many trees has he in all?

Subtraction—(1) 685 — 184; (2) 563 — 124; (3) 670 — 126; (4) $6.50 — $1.24; (5) $5.12 — $2.46; (6) $7.75 — $3.06; (7) 865 — 166; (8) 776 — 243; (9) 648 — 156; (10) 450 — 164. (11) A man earns $768. His living expenses are $263. How much can he save? (12) A lady bought a piano for $650. She paid down $124. She still owes $—? (13) A man bought a piece of cloth containing 450 yards. He sold 165 yards.

How many yards left? (14) A real estate agent bought a house for $650 and sold it for $775. He gained ——? (15) A merchant bought goods to the amount of $648. He sold them for $456. How much money did he lose?

Multiplication—(1) 132 × 3; (2) 106 × 2; (3) 320 × 3; (4) 516 × 3; (5) 729 × 2; (6) 648 × 3; (7) $67.89 × 3; (8) $98.76 × 2; (9) $80.09 × 3; (10) $56.78 × 3. Vary the abstract as follows: (11) 321 × 2 = ? (12) 496 × 3 = ? etc. (13) Multiply 405 by 3. (14) What is the product of 25 and 2? (15) If one horse costs $150, find cost of 3 horses. (16) A lighthouse lamp burns 2 gallons of oil a night. How many gallons will it burn in a year of 365 nights? (17) An ocean steamer goes 759 miles a day. How many miles does it go in 3 days? (18) Mr. Edwards used 215 roses to make a bouquet. How many did he use to make 3 bouquets? (19) There are 5,280 feet in a mile. How many feet in 2 miles?

Division—Divide 184, 624, 826, 468 by 2; 39, 696, 603 and 186 by 3. Vary the examples here: 46 ÷ 2 = ? Divide 63 by 3. Use the terms dividend, divisor and quotient until the children become familiar with them. In the example: James divided 36 candies among 3 boys, giving each one three, which is the divisor, which the dividend and which the quotient? (1) A herdsman paid $186 for 3 cows. What was the cost of one? (2) How many trees in a row in an orchard where 69 trees are planted in 3 rows? (3) How many feet in one stone of a side walk where it takes 3 stones to cover 27 feet? (4) When $486 were paid for 2 horses, what is one worth? (5) By reading 3 pages each evening, how long will it take to read a book of 636 pages?

Second Month.

Reading Numbers—In this month dollars and cents should be combined and read together. Another chart similar to the one mentioned for previous month may be devised to aid in this work, introducing the dollar sign and decimal point. The great advantage of charts of this kind is: (1) The figures are always neat and uniform. (2) They economize time for both teacher and pupil. (3) They make an abundance of drill easier.

The numbers used in addition examples and in writing numbers should be constantly utilized to furnish drill in reading numbers. Drill may be given in this month similar to the first month, using numbers from 5,000 to 7,000, e. g. (1) 5,000 is read ——; 6,000 is read ——; 7,000 is read ——. (2) 5,100 is read ——; 5,125 is read ——; 6,160 is read ——; 7,025 is read ——; 7,020 is read ——? (3) Read 3,725, 2,368, 5,250, 6, 728, 7,000; (4) 6,432, 6,280, 6,105, 5,026, 4,060; (5) 4,225, 6,428, 5,419, 2,856, 3,120; (6) 6,128, 4,045, 5,107, 6,170, 4,090.

Have paragraphs similar to the following read from the board: (1) The number of articles in the sales of a dry goods house for the week ending October 26, 1912 were as follows: Domestics, 5,401; notions, 3,258; woolens, 6,498; dress goods, 3,257. (2) The records of a city post office show the following mail for one day were: Registered letters, 1,725; ordinary letters, 5,279; postal cards, 2,147; book packets, 4,963; parcels, 6,184; newspapers, 6,419.

Easy examples involving dollars and cents should be read from board and from pupil's books just to familiarize the pupils with dollars and cents. (1) A merchant sold goods as follows: Apples for $34, peaches for $55, plums for $68, potatoes for $46. (2) A boy paid 16 cents for candy, 28 cents for a book, 10 cents for a whistle and 75 cents for a ball. (3) Another merchant sold goods for the following amounts: $34.16, $55.28, $68.10, $46.75. (4) Read $1.14, $2.12, $1.21, $3.27, $.41. (5) $2.46, $3.75 $5.68, $10.00, $6.36.

Roman numerals through XXX. A drill chart similar to the one in Fig. 3 should be made by adding one more column for the twenties, e. g., XX, XXI, XXII, XXIII, XXIV, XXV, XVI, XVII, XVIII, XIX, XXX The days of the months may be written with Roman numerals. The leaves of blank books or pads may be numbered with Roman numerals for practice.

Addition—Numbers from 1 to 8 to numbers from 1 to 100 in series increasing by 10. Charts and drill cards similar to those described in previous month will furnish oral drill for numbers from 1 to 8. The new combinations to be added are:

789 777	89 88	189 198

As in the previous month—(1) Add 7 to 7, 17, 27, 37, 47, 57, 67, etc. (2) Add 8 to 8, 18, 28, 38, 48, 58, 68, etc. (3) To the 7 series should also be added 1, 2, 3, 4, 5, 6. (4) To the 8 series should also be added 1, 2, 3, 4, 5, 6, 7,

Problems: (1) How many months was Mr. Smith away from his business this summer if he was sick 8 weeks and then visited 8 weeks more? (2) 9 days and 8 days are — days? (3) Fanny is 7, Lillie is 8. What is the sum of their ages. (4) 7 days in this week and 7 in next week. How many days in these two weeks? (5) 6 blue crayons and 8 red ones. How many crayons in the box? (7) John paid a quarter for a ball and 7 cents for a whistle. How much money did he spend? (8) How many pieces of money in John's pocket if he has 7 pennies and 8 dimes? (9) The school baseball team won 6 games in September and 8 in October. How many games have they won? (10) Mr. Brown bought a coat for $9, and a hat for $6. How much did they both cost?

Counting—By 6's to 100; by 8's to 40; by 2's beginning with 1. (1) Count by 6's from 0 and back to it; (2) by 6's from 0 to 60; (3) by 6's from 0 to 100; (4) by 6's from 48 to 100; (5) by 6's from 0 to 100; (6) by 8's from 0 to 40; (7) by 8's from 0 to 40; (8) by 2's from 0 to 100; (9) 2's from 1 to 21; (10) by 2's from 1 to 51; (11) by 2's from 1 to 101.

Subtraction—(1) Subtract 36 — 7; 35 — 6; 33 — 5; 37 — 4; 32 — 3. (2) 7 from 44, 54, 67, 74 and 84. (3) 63 — 3; 74 — 4; 86 — 5; 95 — 6; 53 — 7. (4) 82 — 5; 96 — 7; 78 — 4; 43 — 7; 87 — 3. (5) 96 — 7; 67 — 4; 82 — 6; 38 — 7; 24 — 5. (6) Which is greater, 50 or 30 and how much? (7) The sum of two numbers is 86. The smaller is 5. What is the larger? (8) Fred earns $53, spends $7. How much does he have left?

(9) An aeroplane went up 43 feet and fell back 7 feet. How high up was it then? (10) In a field were grazing 64 goats and 6 sheep. How many more goats than sheep in the field? (11) A hunter shot 96 animals. They were all deer but 7. How many deer did he shoot? (12) Jack stands 7 feet from a tree. Frank stands 43 feet from the tree. How much farther from the tree is Frank than is Jack? (13) Ned is 7 years old. How much longer must he live to be 33 years old? (14) Lillian has $.84 in her bank. She spends $.07 for Christmas presents. How much money is left in the bank? (15) Illness caused a man who had saved $82 to spend $6 for medicine. How much was left of his savings?

Multiplication—Review counting by 4's. (1) Multiply 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 by 4. (2) $7 \times — = 14$; $8 \times 4 = —$; $— \times 9 = 36$; $6 \times 4 = —$; $5 \times — = 20$. (3) 12×4; 22×4; 32×4; 42×4; 52×4. (4) 16×3; 17×4; 15×2; 18×3; 19×4. (5) A horse eats 7 quarts of oats per week. How many oats will it take to feed him 4 weeks? (6) Find cost of 4 pounds of starch at 8 cents per pound. (7) An ox needs 4 shoes, 12 oxen need — shoes? (8) One pencil costs 4 cents. Find the cost of 8 pencils. (9) 7 cents buys one yard of ribbon. Find the cost of 4 yards of ribbon.

Division—Review counting and multiplication tables of 4's. (1) Divide 16, 20, 12, 8, 28 by 8. (2) Divide 40, 36, 24, 32 and 44 by 4. (3) $16 \div ?$; $? \div 4 = 8$; $24 \div 4 = ?$; $? \div 3 = 6$; $36 \div 4 = ?$ (4) Name two numbers whose product is : 40, 36, 24, 16, 32. (5) In 36 there are — fours; in 24 there are — fours; in 16 there are — fours; in 27 there are — threes; in 24 there are — twos. (6) How many units in a dozen? How many in 4 dozen? In ⅓ of a dozen? (7) How many bushels in 32 pecks of grain when there are 4 pecks in a bushel? (8) Frances paid 36 cents for 4 pieces of ribbon. What did each cost? (9) How many dollars can be made from 12 quarters? (10) Put 44 crayons into 4 boxes. How many will there be in each box?

Measurements—Pound. (1) Children must do actual weighing to appreciate that there are 16 ounces in a pound. (2) One pound is 16 ounces. ½ pound is — ounces; ¼ pound is — ounces. (3) One pound of sugar contains how many 4 ounce packages? How many 8 ounce packages? (4) Name two articles sold by the pound? (5) How many ounces in ½ pound of either? (6) 8 ounces is what part of a pound? (7) What will ½ a pound of spice cost at 2 cents an ounce? (8) How many ounces in ½ pound?; ¼ pound? (9) How many ounces in 2 pounds? (10) ¼ pound and ½ pound make how many ounces? (11) Mary had a pound of sugar. She spilled ¼ of it. How many ounces did she have left? (12) Mr. Walsh's family consumed ½ pound of butter in one day. How many ounces were left? (13) When a pound costs 24 cents, 8 ounces will cost — cents; 2 ounces will cost — cents. (14) 20 ounces is — pound — ounces; 18 ounces is — pound — ounces; 24 ounces is — pound — ounces. (15) How many ounces in 1 pound and 8 ounces? In 2 pounds and 6 ounces? In 3 pounds and 4 ounces? (16) at 5 cents an ounce what will ½ pound of ginger cost?

Grade 3B Plan

Oral.

First Month.

Reading Numbers—See plan for 3A.

Read dollars and cents, using numbers have 4 places for dollars.

Roman numbers, review the first 4 months of 3A.

Addition—Numbers from 1 to 9 to numbers 1 to 100.

Use such charts and "sight cards" as were described in 3A for drill in addition.

Problems should be of the same nature as in 3A, only increasingly difficult and using more and more numbers of the higher decades.

Problems: (1) I paid $65 for furniture, and $15 for some clothing. How much did I spend? (2) 25 books on 1 shelf, 15 on another. How many books on both shelves? (3) Paid 25 cents for knife, and 25 cents for book. How much was paid for both? (4) 56 eggs in one box, 15 in another. How many eggs in both boxes? (5) Had 36 apples, bought 35 more, then I had — apples. (6) Frank's father had $53 and earned 38 more, then he had $—. (7) Frances paid 31 cents for tea and had 15 cents left. How much money had she at first? (8) 39 hats in one row, 20 hats in another row, — hats in both rows. (9) 24 houses on one block, and 18 houses on another block. How many houses on both blocks? (10) A man who had $38 needed $13 more to pay a certain bill. What was the amount of the bill?

Counting—By 6's and 8's reviewed; by 7's. (1) Count by 6's from 0 to 72 and back to 0; (2) by 6's from 1 to 79 and back to 1; (3) by 6's from 2 to 56 and back to 2. (4) Count by 8's from 0 to 72 and back to 0; (5) by 8's from 1 to 81 and back to 1; (6) by 8's from 2 to 74 and back to 2. (7) Count by 7's from 0 to 84 and back to 0; (8) by 7's from 0 to 98 and back to 0; (9) by 7's from 1 to 50 and back to 1; (10) by 7's from 2 to 44 and back to 2.

Subtraction—Review the decimation table of 2B and 3A. Many of the examples given under addition may be reversed and used for subtraction. Use charts and "sight cards" as suggested for 3A.

Ready oral answers should be given to such problems as the following: Subtraction—(1) 87 — 4; 69 — 5; 46 — 7; 38 — 8; 96 — 9. (2) 14 — 5; 24 — 6; 44 — 7; 74 — 8; 94 — 9. (3) 69 — 39; 78 — 4; 65 — 2; 67 — 5; 56 — 3. (4) 78 — 6; 35 — 3; 24 — 14; 87 — 4; 98 — 58. (5) 84 — 34; 69 — 29; 82 — 70; 65 — 21; 88 — 22. (6) A man has 38 horses. He sold 8. Left? (7) After Freddie earned $.44; he spent $.07. How much did he save? (8) A merchant bought a piece of goods containing 87 yards. How much will be left when he sells 4 yards? (9) If it takes 14 yards for a suit, how much will be left from a 24-yard piece of cloth? (10) One man did a piece of work in 74 days. Another man did a similar piece of work in 8 days less time. How many days did the second man work?

Multiplication—See suggestions for first month of 3A. Review counting by 7's. (1) Multiply numbers from 1 to 12 by 7. (2) Put on the blackboard the following: $? \times 7 = 21$; $4 \times 6 = ?$; $7 \times ? = 63$; $? \times 7 = 35$; $5 \times 6 = ?$ Have pupils give an entire statement for an answer. (3) $7 \times$

? = 28; 5 × 7 = ?; ? × 6 = 42; 6 × 5 = ?; 8 × ? = 32. (4) 22 × 4 = ?; 33 × 2 = ?; 11 × 7 = ?; 12 × 4 = ?; 44 × 2 = ?;. (5) 2 × 4 = ?; 5 × 3 = ?; 6 × 7 = ?; 7 × 8 = ?; 7 × 9 = ?

(1) Cost of 7 oranges at a nickel each? (2) In our reader each chapter has 8 pages. There are 7 chapters. How many pages in the reader? (3) A gardener has 7 rows of plum trees with 4 trees in each. How many plum trees are there in the garden? (4) Find the cost of 7 pounds of grapes at $.12 per pound. (5) A furniture dealer has sideboards for $8. How much will he get for 7 sideboards? (6) In one week there are 7 days; in four weeks there are — days?; in five weeks?; in seven weeks?; in six weeks?

Division—Review counting and multiplication table of 7's. (1) Divide numbers 7, 14, 21, 28, 35, 42 by 7. (2) Divide numbers 56, 49, 63, 77, 84, by 7. (3) How many 7's in 63?; in 56?; in 49?; in 70?; in 42? (4) Give the missing number: 42 = ? 7's?; 35 = ? 7's?; 63 = ? 7's?; 56 = ? 7's?; 49 = ? 7's? (5) Name a number which multiplied by 7 will equal 21, 42, 35, 56, 63, 49, 14. (6) James had 49. He divided them among 7 friends. How many did each receive? (7) How many weeks in 63 days? (8) I paid $21 for 7 books. Find the cost of one book. (9) Frank bought 7 Christmas tree ornaments for 56 cents. How much did he pay for each? (10) John put a new cyclometer on his bicycle. After he had ridden 7 days on the wheel it registered 77 miles. That means that he had traveled the average of how many miles per day?

Measurements—Peck, quart, bushel. (1) There are 8 quarts in 1 peck. How many quarts in 4 pecks? (2) How many pecks in a bushel? (3) How many quarts in a bushel? (4) How many quarts in 7 pecks? (5) 56 quarts will make how many pecks? (6) Find the cost of 4 pecks of oats at 10 cents a quart. (7) How many pecks in 32 quarts? (8) 34 quarts = — pecks and — quarts; 27 quarts = — pecks and — quarts; 46 quarts = — pecks and — quarts; 56 quarts = — pecks and — quarts; 60 quarts = — pecks and — quarts. (9) What will 2 bushels of corn cost at $.10 per peck? (10) Which would you rather have, 48 quarts of chestnuts or 1½ bushels of chestnuts? (11) In 1 peck there are 8 quarts; in 2 pecks? in 3 pecks? in 4 pecks? in 5 pecks? (12) One peck contains — more quarts than 6 quarts; one peck contains % more quarts than 5 quarts; one peck contains — more quarts than 4 quarts; one peck contains — more quarts than 6 quarts; one peck contains — more quarts than 5 quarts. (13) One quart taken from 1 peck leaves — quarts? two quarts taken from 1 peck leaves — quarts? three quarts taken from 1 peck leaves — quarts? four quarts taken from 1 peck leaves — quarts? (14) 9 pecks = — bushels — quarts? 27 pecks = — bushels — quarts? 32 pecks = — bushels — quarts? 40 pecks = — bushels — quarts? 18 pecks = — bushels — quarts? (15) Find the cost of 3 bushels of corn at $1 per peck.

Fractions—Review halves, fourths, eighths, thirds. Teach sixths and twelfths. (1) See 3A for examples under halves, fourths, eighths and thirds. (2) Find ⅙ of 6, 12, 18, 24, 30, 36, 42. (3) Find 1/12 of 12, 24, 36, 48, 60, 72, 84. (4) 1 = — twelfths? 1 = — sixths? ½ = — sixths? ½ = — twelfths? (5) ¼ is more or less than 1/12? (6) A barrel of

grain weighs 40 lbs., ¼ is oats, the rest is chaff. How much do the oats weigh? (7) Find ¼ of $16. (8) 1/12 of a year is — months? (9) How much money did a boy spend who spent ¼ of $24? (10) How many inches in ⅙ of a foot?

Written.

Writing Numbers to 5,000. Dollars and cents. Same as in 3A. The numbers and their combinations should be made more difficult wherever that is possible.

Addition—Many of the examples given under "Reading Numbers" and "Writing Numbers" may be used for drill in addition, providing their sum does not exceed 10,000. See 3A example also. Add—(1) $6.00, $60.60, $7.60, $10.76, $1.67, $14.98. (2) $40.04, $14.48, $.09, $109.78, $3.65, $.97. (3) $8.08, $80.18, $118.87, $6.95, $.06, $77.10, $18.76. (4) $.05, $62.17, $.97, $1.68, $10.37, $5.99, $4.78. (5) $56.00, $46.06, $107.14, $6.78, $.96, $6.90, $17.08. (6) A farmer owned several fields containing, the first 270 acres, the second 650 acres, the third 519 acres, the fifth 97 acres. How many acres were there in all? (7) Mr. Lawson bought several wood lots containing, respectively, 386 cords, 475 cords, 89 cords, 239 cords and 129 cords. How many cords of wood did he have when it was all cut? (8) James lives 790 rods from school, William 250 rods farther than James, Charles 173 rods farther than William, Frank 655 rods farther than Charles. How far does Frank live from school? (9) The floor space of a granary is divided into stores of the following size: First contains 263 sq. in.; second, 568 sq. in.; third, 929 sq. in., and fourth, 397 sq. in. Find the number of square inches in the floor space of the granary. (10) A man paid $7,538 for a house; $2,700 for a barn; $9,575 for an automobile; $865 for horses; $10,386 for furniture, and had $25,950 in the bank. Find how much he was worth.

Subtraction—(1) 8,798 — 2,464; (2) 9,768 — 2,169; (3) 6,724 — 2,968; (4) $620.00 — $4.06; (5) 4,004 — 440; (6) $7,006 — $1,689; (7) $26.07 — $14.69; (8) $37.06 — $19.08; (9) $402.13 — $69.85; (10) $8,000 — $1,264. (11) Which is the greater and how much, 4,004 or 4440? (12) Bought a piece of property for $7,125; sold it for $1,689. Did I gain or lose and how much? (13) An orchard has 2,506 trees, 1,548 trees are bearing fruit? (14) A man's income was $4,286 last year and $6,000 this year. How much has it increased? (15) Denver is 5,175 feet above sea level and Chicago is 590. Denver is how many feet higher than Chicago?

Multiplication—(1) 456 × 37; (2) 578 × 27; (3) $6.79 × 17; (4) $14.58 × 76; (5) 546 × 56; (6) 725 × 66; (7) 789 × 47; (8) 678 × 57; (9) 897 × 46;(10) 657 × 75. (11) One mile of sidewalk cost $453. What will 27 miles cost? (12) A railroad conductor took up tickets worth $978 on each trip. How many dollars' worth would he take up on 47 trips? (13) A gentleman paid $640 for a span of horses. He paid 17 times as much for an automobile. What did the automobile cost? (14) A shoe dealer buys 725 boxes of shoes at $56 per box. How much did they cost? (15) A load of hay weighed 679 pounds. How much would 75 such loads weigh?

Division—4214 by 7; 1806 by 6; 2765 by 5; 3656 by 4; 2450 by 7; 8820

by 6; 4074 by 6; 3366 by 3; 8442 by 7; $49.56 by 7. (1) Four tons of hay cost $36.56. Find the cost of 1 ton. (2) The distance from New York to Boston is 234 miles. It takes a train 6 hours to cover that distance. How many miles does the train go an hour? (3) How many weeks will it take to save $18.06 if $6 per week is saved? (4) How many 7-lb. packages of candy can be put up from 2,450 lbs.? (5) At $9 per ton how many tons of coal can be bought for $1,548?

Second Month.

Reading Numbers, same as second month for 3A.

Roman numerals, through LXX. Add two columns to such a chart as is described in the 3A plan, putting on the fifties and sixties.

Addition—Finding the sum of two numbers of two orders. Add—(1) 20, 30; 10, 60; 40, 20; 50, 40; 70, 20. (2) 30, 37; 65, 20; 40, 26; 60, 35; 18, 70. (3) 32, 25; 21, 67; 73, 16; 23, 45; 35, 52. (4) 75, 23; 65, 42; 76, 23; 44, 22; 14, 63. (5) 15, 72; 45, 24; 36, 13; 81, 16; 74, 15. (6) A merchant sold 40 yards of muslin and as many yards of calico. How many yards did he sell in all? (7) A boy walked 16 miles east of his home and from there to a town 15 miles further east. How many miles did he walk? (8) Two monitors filled the ink wells. The first monitor filled 30, while the second filled 37. How many ink wells in the room? (9) In a field were 45 black sheep, and 24 white sheep. How many sheep in the field? (10) A kite went up 60 feet and stopped. Later it arose 35 feet. How high did the kite finally fly? (11) Bought a peck of potatoes for $.72, and some fruit for $.15. How much money did I spend? (12) In one week George spelled 76 words correctly, and misspelled 24 words. How many words in the spelling lessons of the week? (13) The class register shows 40 pupils present yesterday, and 46 pupils present today. How many pupils present on these two days? (14) Ruth found 81 chestnuts under one tree, and 16 more under another tree. How many chestnuts did she find in all? (15) Mark's cyclometer registers 60 miles. How much will it register when he has ridden 35 miles more?

Counting—By 7's and 9's. By 2's and 3's, beginning with any digit. Count by 2's from 1 to 91 and back to 1; by 3's from 1 to 91 and back to 1; by 7's from 0 to 84 and back to 0; by 9's from 0 to 108 and back to 0; by 2's from 3 to 47 and back to 3; by 3's from 2 to 47 and back to 2; by 7's from 1 to 64 and back to 1; by 9's from 1 to 64 and back to 1; by 7's from 2 to 72 and back to 2; by 9's from 2 to 92 and back to 2.

Subtraction—Review as in previous month. Subtract—(1) 14 — 5; 17 — 4; 16 — 7; 15 — 9; 13 — 6. (2) 21 — 8; 31 — 4; 41 — 5; 51 — 6; 61 — 7. (3) 45 — 8; 55 — 6; 65 — 7; 75 — 8; 85 — 9. (4) 67 — 24; 78 — 36; 84 — 62; 96 — 53; 56 — 22. (5) 77 — 17; 86 — 43; 45 — 21; 67 — 34; 97 — 76. (6) Bought a handkerchief for 9 cents. How much change from a quarter? (7) Take 8 splints out of a box containing 21 splints, and the remainder is — splints? (8) On a shelf are 55 books, a servant put away 6 of them and — remain? (9) Harry has $.45 in one pocket and $.21 in another. How much more money in one pocket than in the other?

Multiplication—Review counting by 8's. (1) Multiply numbers 1 to 12 by 8. (2) Once 8 is —; 4 times 8 are —; 6 times 8 are —; 8 times 5 are —; 8 times 7 are —. (3) 6×6; 7×8; 8×5; 9×7; 12×8. (4) $6 \times ? = 48$; $8 \times ? = 72$; $? \times 8 = 64$; $8 \times 5 = ?$; $? \times 8 = 40$. (5) 21×8; 31×7; 41×8; 11×6; 12×7.

(1) At 10 miles per hour, how far can I ride in an automobile in 8 hours? (2) At $.11 per pound, what will 8 pounds of currants cost? (3) A man earns $5 per day. How much will he earn in 8 days? (4) Find the cost of 8 barrels of flour at $6 per barrel. (5) A farmer has 7 sheep and 8 times as many hens. How many hens has he?

Division—Review counting and multiplication table of 8's. (1) Divide 24, 16, 32, 48, 64 by 8. (2) Divide 72, 88, 96, 40, 56 by 8. (3) In 64 there are — 8's. In 40? In 32? In 56? In 48? (4) Name two numbers whose product is 24, 16, 56, 48, 80, 32, 40, 64. (5) How many 8's in 88, 64, 80, 72, 56, 40, 48? (6) How many pecks in 32 quarts? (7) How many half-pound packages of candy can be weighed out of 40 ounces? (8) Mrs. Clark went into a department store and paid $56 for 8 yards of carpet. What price per yard was she charged for the carpet? (9) A man received $72 for 8 days' work. How much is that per day? (10) It takes one man 48 days to do a piece of work. How long would it take 8 men to do that work?

Measurements—Square inch. The following examples are taken from Morey's Elementary Arithmetic, Part II, pages 81-83. (1) "Draw a square 1 inch long and one inch wide. This is a square inch." (2) "Draw another square beside it. This is an oblong or rectangle. It is — inches long, and — inches wide, and contains — square inches." (3) "Draw an oblong 6 inches long and 3 inches wide. Mark off into inch squares. How many square inches in the oblong." (4) How many 2-inch squares can be cut from a piece of paper 8 inches long and 2 inches wide." (5) "How many inch squares will be required to make a rectangle 8 inches long and 2 inches wide? (6) How do we determine the number of square inches in a rectangle 4 inches long and 3 inches wide? (7) How many inch squares of mosaic marble will be needed to cover a wall space 8×4? (8) A 2-inch square is what part of a rectangle 6 inches long and 3 inches wide? (9) A piece of paper is 8 inches long and 10 inches wide. How many square inches does it contain? (10) A square blotter containing 16 square inches is how long on each side?

Note.—Excellent concrete examples for this kind of work are also given in Hall's Primary Arithmetic.

Fractions—Review fifths and tenths; thirds and fourths. Teach two-third of multiples of 3 within the tables. Review by rising examples similar to those given in 3A for fifths, tenths, thirds and fourths. (1) What is $\frac{1}{3}$ of 6, 12, 18, 24, etc., to 48? (2) What is $\frac{2}{3}$ of 6, 12, 18, 24, etc., to 48? (3) I spent $\frac{1}{2}$ of a dollar for a ball and 1/10 of a dollar for candy. How much money did I spend? (4) Give Samuel 1/10 of a dollar. How much money will he get? (5) 1/10 of a class failed to be promoted. How many were left back? (6) Mary bought $\frac{1}{4}$ of a dozen bananas. How many did she buy? (7) At 24 cents per dozen, how much will $\frac{2}{3}$ of a dozen of oranges cost? (8) 30 crayons in a box; $\frac{2}{3}$ are red ones. How many are red? (9)

8 apples were cut into thirds and ⅔ of the pieces were thrown away. How many pieces were thrown away?

Writing Numbers to 5,000. Dollars and cents. See 3A.

Addition—See "Reading" and "Writing" of numbers and 3A examples. Add—(1) $.94, $51.29, $7.86, $60.28, $50.34, $1.28. (2) $.07, $80.08, $6.16, $606.66, $78.27, $6.19. (3) $.36, $28.40, $186.29, $76.89, $206.00, $30.28. (4) 637, 162, 1,446, 697, 2,057, 1,434. (5) 1,596, 278, 2,689, 567, 1,678, 1,002. (6) A certain railroad has the following mileage: In Illinois, 4,509 miles; in Michigan, 638 miles; in Iowa, 9,568 miles; in Nebraska, 2,181 miles; in Nevada, 1,257 miles; in California, 4,867 miles. How many miles in all? (7) The income of a corporation handling merchandise was recently as follows in these divisions of the States: North Atlantic division, $6,758; South Atlantic division, $15,916; South Central division, $9,025; North Central division, $48,279; and Western division, $20,003. What was the total for all these divisions? (8) The accounts of 6 depositors in a New York City bank totaled as follows: 1, $7,500; 2, $958; 3, $2,678; 4, $49,300; 5, $16,095; 6, $8,308. What was the grand total for the 6 accounts? (9) A business borrowed money as follows: June 12, 1902, $5,680; September 15, 1902, $10,700; June 5, 1903, $14,150; September 25, 1903, $9,016; June 15, 1904, $27,219; September 20, 1904, $13,995; December 6, 1904, $5,000. How much was he in debt by the first of January, 1905? (10) A boy rode on his wheel 127 yards in the first week; 218 yards in the second week; 567 yards in the third week; 48 in the fourth week; 450 yards in the fifth week; 200 yards in the sixth week. How many yards did he ride in the six weeks?

Subtraction—8,259 — 1,679; 6,642 — 2,168; 4,283 — 3,146; 3,874 — 1,687; 8,645 — 6,257; 6,147 — 1,269; $80.06 — $20.98; $45.63 — $21.89; $64.31 — $26.74; $47.65 — $10.09. A farmer raised 3,785 bushels of grain. He sold 1,896 bushels. How many bushels did he keep? A man paid $4,500 for an automobile and $3,125 for a house. Which cost the more and how much? A merchant had $5,764, and spent $1,008 for cotton goods, and the remainder for woolen goods. How much for woolen goods? M's estate is worth $6,700, which is $2,864 more than N's is worth. How much is N's worth? A cashier received $6,200 and paid out $1,728. How much more did she receive than she paid out?

Multiplication—642 × 18; 759 × 36; 496 × 58; 728 × 45; 836 × 28; 904 × 75; $16.07 × 86; $76.98 × 83; $49.67 × 76; $80.09 × 58. In a certain example the multiplicand is 642, the mupltiplier is 18. What is the product? How many square inches in a plot of ground 387 inches wide and 58 inches long? What is the cost of 28 pounds of tea at 75 cents per pound? How many quarts in 836 bushels? If there are 4,967 kernels of wheat in one bushel, how many kernels in 76?

Division—Divide 9,608, 8,536, $76.72 by 7; 2,598 by 8; 4,340 by 7; 2,768 by 8; 1,659 by 7; 3,608 by 8; 1,065 by 5; $27.68 by 8. 8 books cost $8.24. What is the cost of 1 book? An electric car ran 576 miles in 8 days. How many miles per day? Find the cost of one horse when 8 horses can be bought for $3,608. 2,598 packages of cereal were put in 8 boxes. How many packages in each box? How many 5-lb. boxes of candy can be made from 6,785 lbs. of candy?

Arithmetic Examples—4A

First Week.

Oral.

(1) A man gathered 16 bushels of apples. He sold 7 bushels. How many bushels did he have left? (2) How long will 24 quarts of oats last a horse if he is fed 6 quarts a day? (3) Eight nails are used to fasten a horse shoe. How many shoes can be fastened with 72 nails? (4) If a boy requires 36 days to eat a certain quantity of food how long would it last 9 boys? (5) What is the cost of a half dozen oranges at 3 cents each? (6) If candy is $.20 a pound, what is the cost of ½ pound? (7) A man divides $84 equally among 7 boys. How much does each receive? (8) Mrs. Smith bought ½ pound of butter. How many ounces did she receive? (9) If 2 yards of muslin cost 16 cents, what will 3 yards cost? (10) How many square inches are there in ½ of a square foot?

Written.

Write from dictation and add: 5,045, 609, 18,055, 98,463, 4,259. $1,000.00, $426.75, $182.00, $962.76, $80.49. 22,468, 1,043, 93, 42,784, 96,398, 4,000, 100,000. $416.75, $82.30, $900.09, $581.00, $40.96, $1.75. 27,063, 100, 5,006, 20,020, 99,999, 4,284, 10,090.

Subtract and prove: 84,246 — 19,984. 27,398 — 989. 12,659 — 8,496. 98,050 — 27,658. 27,346 — 18,296.

Multiply: 27,486 × 70. 84,265 × 79. 18,350 × 43. 86,275 × 80. 23,496 × 96.

Divide: 8,622 ÷ 3. 9,848 ÷ 4. 27,654 ÷ 6. 82,985 ÷ 7. 46,899 ÷ 9.

Problems—(1) In one lot of flour there were 148 barrels, in a second lot 219 barrels, and 167 barrels in a third lot. How many barrels in the three lots? (2) A box of nectarines cost $3.24. It was sold for $2.05 more than it cost. For what was it sold? (3) Mrs. Mills paid $12 for materials for a dress, and paid the dressmaker $2 a day for 4 days. What did the dress cost? (4) I bought a tub of butter weighing 87 pounds. How many ounces did it weigh? (5) A woman had 11 summer boarders. Each paid $8 a week. How much did she receive in 5 weeks? (6) Mr. Smith owns 87 acres of land. One acre is worth $8.25. What is it all worth? (7) It takes a train 6 hours to go from Boston to New York, a distance of 234 miles. How many miles does the train go an hour? (8) If John can save $3.24 in 9 weeks, how much can he save in 10 weeks? (9) A man paid $300 each for two horses and $200 each for 3 horses. What did the 5 horses cost? (10) How many square inches will there be in 39 square feet?

Second Week.

Oral.

Since this is the last grade where Roman numerals are treated all the principles underlying the system should be reviewed, not forgetting to show that a dash above a letter or combination of letters in Roman notation increases its value a thousand fold as:

$\overline{\text{IV}} = 4{,}000.$ $\overline{\text{X}} = 10{,}000.$ $\overline{\text{D}} = 500{,}000.$

Problems—(1) John has $.16 and his sister Mary has $.18 more than he has. How much has Mary? (2) At $.11 apiece, what would be the cost of 8 note books? (3) If there are 132 books in 11 rows, how many are there in 6 rows? (4) What will be the cost of ½ pound of candy at $.04 an ounce? (5) Mr. Jones raised 48 bushels of oats. He sold ¾ of them. How many bushels did he sell? (6) If a dealer sells 9 yards of ribbon for $.81, how much will he receive for 6 yards? (7) A grocer bought 36 pounds of tea. He sold ¼ of the amount. How many pounds were left to be sold? (8) If 4 books cost 15 cents, what will 8 books cost? (9) Mr. Brown bought ¾ of a pound of butter on Monday and ½ of a pound on Tuesday. How many ounces did he buy together? (10) John had 28 marbles. He lost ¾ of them. Then he bought 10 more. How many had he then?

Written.

Write from dictation and add: $349.47, $19.63, $1,004.50, $89.00, $96,050.09. 13,400, 9,006, 48,060, 19,028, 100,000, 78,009. $14.05, $106.08, $1,000.96, $848.48, $19,000.75. 96,989, 4,457, 18,966, 9,027, 37,748, 8,060. $42.75, $18.40, $127.63 $19.27, $846.09, $.86.

Subtract: 34,369 — 18,486. $230.30 — $19.07. From $500 take $.05. 84,298 — 49,369. 100,000 — 92,507.

Multiply: 3,489 × 320. $863.59 × 250. $132.69 × 755. 8,346 × 396. 1,025 × 890.

Divide: 3,497 ÷ 9. 18,327 ÷ 10. 46,228 ÷ 11. 39,846 ÷ 8. 18,020 ÷ 9.

Problems—(1) Mary had 28 buttons. She used 19 of them. How many did she have left? (2) A farmer owned 8 cows. His neighbor owned 6 times as many. How many did his neighbor own? (3) There are 7 pounds of candy in one box and 9 pounds in another box. How many ounces in both boxes? (4) A man had 296 pounds of butter. He sold ¾ of it. How many pounds had he left? (5) Find the loss on 8 cows bought for $896 and sold at $65 each. (6) A lot cost $750 and the house built on it cost three times as much. What did both cost? (7) A farmer had 42 bags of rye each containing 11 bushels. How much rye had he left after selling 245 bushels? (8) A farmer exchanged 22 sheep, each worth $9, for pigs worth $11 each. How many pigs did he get? (9) A barrel of flour weighs 196 pounds. How many ounces does it weigh? (10) A man sold a house for $9,500, thereby losing $498. How much did the house cost him?

Third Week.

Oral.

(1) A man bought 30 cows. He sold ⅗ of them. How many were left? (2) Mrs. Jones had $.29. She spent $.16 and then put $.12 more in her purse. How much did she have then? (3) How long will it take one man to do a piece of work if it takes 11 men 8 days to do it? (4) A farmer had 25 sheep. He bought 42 and sold 16. How many sheep had he then? (5) The distance between New York and Albany is 140 miles, and the fare is $2.80. What is the rate per mile? (6) When butter is worth $.36 a pound, how much must be paid for ¾ of a pound? (7) If 9 coats cost $54, how much must be paid for 11 coats of the same kind? (8) A man owed

$63. He pays his debt in sheep worth $9 each. How many sheep will he have to give? (9) John and Henry bought 11 boxes of candy at $.05 each. If John pays $.30, how much will Henry have to pay? (10) A pole is 55 feet long. If 3/5 of it are broken off, how many feet will remain?

Written.

98,276, 1,005, 27,060, 8,549, 29,345. $421.75, $18.20, $496.45, $1,000.76, $89,256.04. 86,290, 4,096, 75,296, 1,010, 49,698. $84.27, $9.05, $429.63, $82.48, $19.96. $46,296.25 — $48.96. 14,250 — 9,876. 27,345 — 16,984. 96,050 — 27,069. $100,000 — $298.50. Short method by 10: 34,269, 8,275, $64.75, 18,298, 46,398 × 10.

Long division: 231 ÷ 21; 462 ÷ 21; 273 ÷ 21; 1,365 ÷ 21; 1,176 ÷ 21.

Problems—(1) If a farm of 21 acres cost $2,352, what is the price per acre? (2) At $21 each how many horses can be bought for $1,764? (3) A man paid $2,675 for a lot, $4,278 for a house, $1,216 for a barn, and $496 for grading. What did the property cost him? (4) A farm was bought for $7,549 and sold for $6,188.50. What was the loss? (5) There were 6,203 votes cast for two candidates. The successful one received 4,879. How many votes did the other receive? (6) Find the cost of 476 bushels of corn at $.95 a bushel. (7) Change 981 square feet to square yards. (8) A farmer bought 209 acres of land, each costing $445. What did all the land cost him? (9) A company of 21 men bought a business for $6,433. They sold it for $5,467. How much did each man lose by the transaction? (10) Multiply the difference between 9,528 and 4,169 by 208. What is the product?

FOURTH WEEK.

Oral.

(1) Mr. Howard bought a shipment of flour for $38 and sold it for $27 more than cost. Find the selling price. (2) A man rode 37 miles on Friday and 18 miles on Saturday. How many miles did he ride in all? (3) What is the cost of books at 12 cents, one at 29 cents and one at 16 cents? (4) Our principal gave us 35 words to spell. John spelled 29 correctly. How many did he miss? (5) A piece of land is 7 rods wide. Its length is 12 times its width? What is its length? (6) A person pays 12 cents each for a dozen candles. If he gives the dealer $1.50 how much change will he receive? (7) If a farmer pays $60 for 5 sheep, how much will he have to pay for 10 sheep of the same grade? (8) Mr. Somers bought a coat for $36. He sold it for 2/3 of what it cost. How much did he lose? (9) 9 and what other factor make 108? (10) A man had $72. He bought a cow for $32 and with the remainder he bought sheep at $8 apiece. How many sheep did he buy?

Written.

Add—$843.82, $8.97, $469.82, $98.13, $417.91, $20.38. $816.29, $1,005.40, $96.28, $9,050.46, $82.75. 24,698, 9,276, 18,298, 4,005, 19,476, 8,259. 23,469, 87, 2,098, 96,070, 74,059, 81,348. 26,396, 18,050, 2,075, 38,059 5,075, 8,329.

Subtract: 55,969 — 18,275. $823.48 — $293.68. 17,245 — 9,060. 83,056 — 79,324. $923.46 — $873.96.

Multiply—Short process by 100. Review 10: 843 × 100; $27.10 × 100; $348.50 × 10; $13,756 × 100; 9,657 × 100; $843.75 × 209.

Division by 21. No remainder: 1,575 ÷ 21; 882 ÷ 21; 2,056 ÷ 21; 1,764 ÷ 21; 1,639 ÷ 21.

Problems—(1) A man who had $958 earned $368 more in one month, $928 in another, and $256 in another. He spent $450 for expenses. How much had he left? (2) A merchant bought 3,698 pounds of iron, 4,758 pounds of steel, 938 pounds of brass. It was all unloaded on the pier at one time. Then 11 loads, each weighing 208 pounds, were removed. How many pounds remained? (3) From a piece of cloth containing 1,000 yards, 27 yards were sold at one time, and 68 yards at another. How many yards remained? (4) Multiply the difference between 5,489 and 2,168 by 307. What is the product? (5) A man who owed $3,744, paid $2,169 of his debt. How long will it take him to pay the remainder at $21 per week?

Fifth Week.

Oral.

(1) Frances picked 47 quarts of berries and her brother picked 39 quarts. How many did both pick? (2) A girl lives 4 rods from school. How many rods does she walk in 5 days going and coming? (3) A horse cost $100 and a wagon ⅗ as much. How much did both together cost? (4) A horse travels 9 miles in 2 hours. At this rate how long does it take him to go 18 miles? (5) John has 30 marbles and his brother has 20. If they divide the whole number equally, how many will each have? (6) A farmer had 48 bushels of oats. He kept 40 bushels and sold the rest at $½ a bushel. How much did they bring? (7) How many feet are there in one-half mile? (8) A lady had a yard of silk. She used ¾ of it. How many inches did she have left? (9) There are 96 two-inch nails in a pound; how many in 4 ounces? (10) Find the cost of 1,200 bricks at $7 a hundred.

Written.

34,296, 3,498, 18,236, 5,738, 849. $182.69, $57.58, $273.67, $52.89, $8.46. 16,298, 496, 83,347, 96,284, 98,396, 4,059. 86,346, 5,985, 18,948, 2,349, 859. 42,986, 19,475, 18,059, 4,027, 27,050, 82,496.

Subtract: 84,269 — 59,345. 29,346 — 17,398. $500.00 — $269.85. 29,346 — 17,398. 27,348 — 1,009. 82,758 — 19, 348.

Multiply: 84,396 × 100; $275.45 × 10; $346.75 × 406; 18,340 × 559; 83,968 × 842.

Divide: 8,349 ÷ 31; 9,675 ÷ 41; 84,629 ÷ 51; 69,485 ÷ 61; 28,498 ÷ 21.

Problems—(1) A man spent $136.25 during one year for a house that rents for $285 a year. How much had he left out of the year's rent? (2) If coats are worth $41 each, how many can be bought for $1,107. (3) A man bought a house for $4,750. He spent $375 on it and then sold it for $6,000. How much did he gain? (4) If an acre of land is worth $575, how much must be paid for a farm containing 408 acres? (5) A grocer buys a cheese for $2.50, a barrel of sugar for $6.50, a box of soap for $3.75. He pays the bill with $15. How much change does he receive?

Sixth Week.

Oral.

Problems—(1) A boy had $.98. He spent $.16 for candy. How many cents had he left? (2) I bought 12 candies for 1 cent. How many

can I buy for 3 cents? (3) A boy had 54 marbles. He lost 5/6 of them. How many did he lose? (4) If the circumference of a wheel is 8 feet, how many times will it turn in going 96 feet? (5) How many inches are there in 1/6 of a yard? (6) John had $.58. He spent $.23 and then his sister gave him $.25 more. How much had he then? (7) How many ounces does a man buy if he buys 2½ pounds of candy? (8) A man bought 200 cows at $12 each. How much did he pay for them? (9) 96 apples were divided equally among 12 boys. How many apples did each receive? (10) At $12 each, how many books can I buy for $84. If I sold them at $8 apiece, how much would I gain?

Written.

Add: 84,236, 19,178, 2,983, 409, 29,327, 42,016. $12.16, $849.54, $19.88, $349.27, $85.38. 27,345, 18,936, 5,205, 18,906, 209, 4,059. $82,648, $329.68, $10.08, $435.75, $93.68.

Subtract: 84,278 — 9,080. $426.27 — $128.48. 18,269 — 98. 34,269 — 17,346. $829.00 — $549.75.

Multiply: $843.75 × 856. $186.72 × 908. 34,670 × 100. $84.75 × 100. $934.65 × 10.

Divide: 84,269 ÷ 22; 93,483 ÷ 32; 16,973 ÷ 42; 8,298 ÷ 52; 89,365 ÷ 62, etc.

Problems—(1) At $52 apiece, how many cows can be bought for $2,028. (2) A dealer bought 280 sheep at $6.25 apiece. He sold them for $2,460. How much did he gain on the transaction? (3) I bought 120 bushels of wheat at the rate of 12 bushels for $10.56. I sold it for $104.40. How much did I lose? (4) A man bought a farm for $18,765. He sold it for $35,000 after spending $2,750 for repairs and $1,578 to stock it. How much did he gain? (5) If there are 320 rods in a mile, how many rods will a man walk if he walks 56 miles?

Seventh Week.

Oral.

(1) At $.25 an inch, how much will 5 inches of silver chain be worth? (2) How many times must you walk one foot in order to walk one mile? (3) If an ounce of tea costs $.05, how much will ½ pound cost? (4) At $.60 a pound, what will 5/6 of a pound of tea cost? (5) If I walk 1 mile in 15 minutes, how far can I walk in an hour? (6) Mary had 80 cents. She bought a doll for 40 cents and spent the remainder for candy at 20 cents a pound. How many pounds did she buy? (7) If coffee is worth $.32 a pound, how much will I pay for a pound and a half? (8) A farmer had 60 acres of land. Forty acres are planted in corn, ¾ of the remainder are planted in wheat. How many acres of wheat has he? (9) James had 80 cents. After spending 60 cents and earning 75 cents, how much had he? (10) A book has 72 pages. After reading 5/6 of it, how many pages remain to be read?

Written.

Add—20,856, 8,937, 9,659, 10,896, 5,757. 6,088, 12,705, 8,429, 678, 26,596. $17.68, $843.45, $69.87, $126.29, $48.68. 34,682, 19,847, 63,288, 4,305, 19,874.

Subtract: 18,248 — 9,259; $420.00 — $169.84. $1,000.10 — $846.96; $2,750.00 — $1,698.98; $2,000.00 — $199.99.

Multiply: 1,240 × 83; 1,506 × 48; 347 × 343; 92,512 by 73; 606 × 808.

Divide: 3,786 ÷ 23; 9,363 ÷ 33; 47,329 ÷ 63; 56,432 ÷ 83; 762,358 ÷ 73, etc.

Problems—(1) If 1,749 pounds of seed cotton can be raised on an acre of land, how many pounds can be raised on 386 acres? (2) A planter raised 43,256 pounds of cotton on 92 acres of land. What was the average number of pounds to an acre? (3) If a young man receives $25 a week, and he pays $8 a week for board and $5 for other expenses, in how many weeks will he be able to pay a debt of $540? (4) There are 90 windows in a building and 12 panes of glass in each window. How much will it cost to clean them at the rate of 6 panes for 2 cents? (5) What is the cost of 18 barrels of apples, if 3 barrels cost $10.50? (Ratio method.)

Eighth Week.

Oral.

(1) If a pennant cost $.25, how many can you buy for $.75? (2) I bought 24 postals for $.27 and sold them at 3 for $.05. How much did I gain on all? (3) I had $½ and spent 2 dimes. Then I found 5 cents and spent 10 cents for candy. How much did I have then? (4) How many pencils at 50 cents each can I buy with the money I have left? (5) What is the cost of ⅜ of a yard of ribbon at 32 cents a yard? (6) At the rate of 3 apples for 5 cents, how much shall I pay for a dozen? (7) If 11 books cost $1.10, find the cost of 10 books. (8) How much will ⅞ of a yard of silk cost at 96 cents a yard? (9) Give two factors of each of the following numbers: 15, 20, 36, 42, 12, 38. (10) How many pints are there in ½ a bushel of oats?

Written.

Add: 13,898, 4,959, 10,347, 8,654, 9,789. $19.99, $87.68, $159.57, $98.93, $186.86. $87.78, $25.84, $89.59, $67.98, $5.98, $21.56. 84,267, 9,045, 18,269, 27,348, 5,769, 1,055.

Subtract: 80,808 — 54,792. $430.03 — $95.48. From $1,000 take $54.45. 92,097 — 86,549. $650.05 — $495.86.

Multiply: 389 by 48 and divide the product by 62. $340.50 × 206. $429.85 × 349. 59,427 by 59. 807 by 768.

Divide 25,638 by 84. 17,238 by 64. 3,984 by 54. 89,367 by 44. 37,340 by 74.

Problems—(1) What is the cost of 71 pounds of beef at 17 cents a pound, 28 pounds of bacon at 15 cents a pound, 34 pounds of pork at 12 cents a pound? (2) A farmer sold 75 sheep that cost him $265 at $4.75 a head. How much did he make? (3) What will be the cost of 15 pounds and 8 ounces of tea at $.60 a pound? (4) A boy went to the store with $10. He bought 14 pounds of sugar at 7 pounds for $.38, and 12 cans of soup at the rate of 3 cans for $.25. How much change did he receive? (5) If 94 books cost $103.40, what is the cost of 5 books?

Additional Examples.

Oral.

(1) If 3 apples cost $.08, what will 9 apples cost? (2) If 6 oranges can be bought for $.20, what will 3 oranges cost? (3) Add 20 and 30; 25 and 30; 25 and 36. (4) Add 18 and 17; 36 and 48; 24 and 16. (5) Subtract 16 from 40; 48 from 75. (6) Read 4,317; 6,090; 5,109; 2,005; 7,079. (7) Read 84,317; 16,090; 76,408; 90,500. (8) Had $70 and spent $36 for rent. How much was left? (9) If you earn $18 in one month and $26 in another, how much do you earn in both? (10) At $.09 a qt., what is the cost of 1 gal. 1 qt. of milk? (11) If 60 yds. carpet will cover a parlor floor, how many yards to cover a floor 5/6 as large? (12) If a boy earns $.48 a day and spends 1/6 of it for lunch, how much does he spend? How much left? (13) Read 80,900; 17,080; 15,842. (14) Had 36 marbles and bought 48 more. How many then? (15) A boy did 45 examples and 28 were right. How many wrong ? (16) What is the cost of 15 pencils, if 5 cost $.09? (17) How many marbles can a boy buy for $.18, if 4 cost $.06? (18) Joseph received 40 postals. Fred had 3/5 as many. How many had Fred? (19) Add 36 and 27; 78 and 17; 45 and 38. (20) I had 64 nuts and ate 1/8 of them. How many did I eat? (21) Had 72 cards and gave away 1/8 of them. How many had I left? (22) If I earn $.56 and spend 1/8 of it, how much have I left? (23) At $.80 a pk., what is the cost of 3 qts. of apples? (24) Tied 1/8 of a yd. of string to a piece 5/8 yd. long. How long was it then? (25) Had 2 5/8 yds. ribbon and used 1 1/8 yds. How much had I left?

(1) Bought 40 yds. cloth. Used 27 yds. How much left? (2) Had 64 nuts. Ate 3/8 of them. How many eaten? (3) Boy went to the store with $.50. He bought 3 lbs. sugar at $.05 a lb. How much had he left? (4) Count by 10's to 120. (5) John had 11 marbles. James had 10 times as many. How many had James? (6) $9 \times 10 \div 3 = ?$ (7) $12 \times 10 - 20 \div 2 = ?$ (8) 40 boys were in a room. After 3/8 of them went down to recess how many were left in the room? (9) A girl had 56 cherries. After eating 3/8 of them she gave the rest away. How many did she give away? (10) Will had 7/8 lb. of candy. He ate 3/8 lb. and then bought 1/8 lb. How much had he then? (11) $\$5\frac{3}{4} - \$2\frac{1}{4} = ?$ (12) How many sq. ft. of cloth will it take to cover a table 4 ft. long and 3 ft. wide? (13) How many minutes in 1/6 of a day? (14) How many days in November, December and January? (15) If 4 candies are worth $.05, how many may be bought with a quarter of a dollar? (16) Change 2 yds. 1 ft. to inches. (17) If there are 60 boys in a class, and 5/6 of them are perfect, how many are perfect? (18) If grape fruit are sold 2 for a quarter, how many can be bought with $1? (19) Eggs are $.40 a doz. What is the cost of 3? (20) If 10 caps cost $1.20, what is the cost of 5? (21) Add 5/7 to 2/7. Subtract 1/7. (22) At $.40 a lb., what is the cost of 2 ozs. of pepper. (23) How many gals. in 80 pts.? (24) At $.30 an hour, how much can a man earn in 2 hrs. 30 mins.? (25) $10 \times 9 - 20 + 30 = ?$

Written.

(1) Add 8,091; 4,017; 6,900; 3,205. (2) Add 48,091; 64,017; 26,900; 33,205. (3) From 90,314 subtract 17,224. (4) At $1.98 each, what are 34 silver spoons worth? (5) A farmer had 1,178 hens. 5/6 of them were laying. How many were laying? (6) If 10 lots are worth $938, what are 5 lots worth? (7) Multiply seven hundred seventy-eight by fifty-seven. Prove. (8) If a man earns $1,428 a year and spends 1/4 of it, how much has he left? (9) Divide 8,437 by 24. Prove. (10) Divide 6,849 by 35. Prove. (11) If 36 lots cost $7,920, what are 9 worth? (12) If 24 bbls. apples are worth $87.12, what is 1/3 bbl. worth? (13) What are 36 coats worth, if 9 cost $39.80? (14) Multiply 847 by 69 and divide result by 33. (15) Add ninety-five thousand forty to seven thousand one hundred eleven, and subtract ninety-two thousand three hundred seven from the sum. (16) In a week a boy dug 864 clams. He sold 5/6 of them. How many did he keep for his own use? (17) Fred caught 25 fish that weighed 3 lbs. each. He sold them at $.09 a lb. How much did he receive? (18) A grocer sold 26 lbs. of 60-cent tea to a hotelkeeper. How much change from a $20 gold piece? (19) How many sq. ins. in 8 doz. sheets of foolscap, if each sheet is 8 ins. by 12 ins.? (20) A dealer received 360 bbls. of apples and potatoes. 3/5 of them were apples. How many were potatoes? (21) $28\frac{3}{4} + 17\frac{1}{4} + 52\frac{1}{4} + 79\frac{3}{4} + 8\frac{3}{4} = ?$ (22) From $8,947\frac{5}{6}$ subtract $7,039\frac{1}{6}$. (23) Add 5/8, 3/8, 1/8, 7/8. (24) Find 1/8 of 47,360. (25) A company owns 696 rowboats. 1/8 were rented. How many were rented?

(1) Multiply 98 by 89 and divide the result by 9. (2) 60,436 — 2,809 + 14,096 = ? (3) 428 × 123 = ? (4) Multiply 2,046 by 324. (5) At $2.87 a day, how much does a man earn in 214 days? (6) Divide 8,430 by 10; 976 by 10. (7) Divide 4,380 by 20; 6,884 by 20; 8,964 by 40. (8) At $20.40 a ton, what is the value of 314 tons of hay? (9) Fred's salary was $30 a month. He spent $15 1/4 for board and $3 3/4 for clothes. How much did he save? (10) Divide 89,764 by 84; by 78; by 69. (11) A school contained 2,864 pupils. 3/8 of them were born in the United States. How many were foreigners? (12) Find the sum of $89\frac{3}{5}$, $76\frac{1}{5}$, $9\frac{4}{5}$, $18\frac{3}{5}$. (13) A piece of cloth contained $28\frac{7}{8}$ yds. $16\frac{1}{8}$ yds. were sold to one lady and $7\frac{3}{8}$ to another. How much was left? (14) If 50 doz. blank books are worth $100.50, what will 9 doz. cost? (15) Change 3 days 5 hours to minutes. (16) Change 8,940 minutes to days. (17) A man's salary was $2,744. He saved 3/8 of it. How much did he spend? (18) How many sq. ft. of carpet will be used to cover 6 benches 18 ins. long and 12 ins. wide? (19) Change 1,437 ozs. to pounds. (20) At $.50 an hour, what will a man earn in six days, working 9 hours a day? (21) 431 × 108 ÷ 76 = ? (22) If 5 doz. chairs are worth $130.80, what are 5 worth? (23) How many sq. ft. in 20 doz. rugs 6 ft. by 4 ft.? (24) How many bushels in 3/5 of 1,728 pks.? (25) The floor of my room has 384 sq. ft. in it. How long is it, if it is 16 ft. wide?

Grade—4B

First Week.

Oral.—Reading numbers—To 1,000,000 dollars and cents.

Read—56,489; 19,002; 96,205; 108,450; 1,369,563; 1,000,005; 278,718; 580,058; 920,004; 800,025.

Counting—By 6's and 7's, beginning with any digit. Count by 6's, beginning with 1, 2, 3, 4, 5, 6, 7, 8, 9. Count by 7's, beginning with 1, 2, 3, 4, 5, 6, 7, 8, 9.

Addition—Adding any two numbers of two orders::

37	25	34	49	58	45	36	56	27	42	65	45
23	19	27	36	29	24	15	39	18	27	38	39
—	—	—	—	—	—	—	—	—	—	—	—

Subtraction—Finding difference between two numbers of two orders:

29	34	42	50	28	37	53	48	24	22	38	56
15	28	36	42	15	22	26	32	16	18	19	29
—	—	—	—	—	—	—	—	—	—	—	—

Multiplication—Review tables through 12×12. Rapidly multiply each of the following numbers by 7, by 8, by 9: 5, 3, 9, 7, 1, 4, 8, 6, 2.

Division—Dividing at sight with remainders 2 and 3 as divisors, 29, 37, 31, 35, 15, 19, 45, 21, 17, 23, etc.

Measurement—Review inch, foot and yard. Teach square inch. A square whose side is one inch is a square inch. Measurement of top of desk, book, paper, etc., by placing a square inch upon the surface and calculating the number of times it will go.

Fractions—Finding parts of numbers through $\frac{5}{6}$ of multiples of denominators, respectively, within the tables. Rapid drills: $\frac{1}{3}$ and $\frac{2}{3}$ of: 15, 45, 36, 42, 18, 54, 9, 27. $\frac{1}{4}$ and $\frac{3}{4}$ of: 24, 12, 20, 32, 28, 48, 36, 16. $\frac{1}{6}$ and $\frac{5}{6}$ of: 30, 24, 42, 54, 48, 60, 36, 18. $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$ of: 10, 35, 45, 15, 25, 40, 20, 50.

Problems—Making use of denominate numbers and other numbers learned.

(1) A boy had 98 cents; spent 16 cents for candy. How many cents left?

(2) I bought 14 candies for 1 cent. How many can I buy for 2 cents?

(3) James earned 45 cents. How much can he spend to have 25 cents left.

(4) When calico is 3 cents a yard, how many yards for 30 cents?

(5) What is the cost of 3 melons at 8 cents each, and 8 apples at 3 cents each?

(6) When eggs are 3 cents, how much will $\frac{1}{2}$ dozen cost?

(7) How many inches are there in 2 yards?

(8) How many inches in $\frac{1}{2}$ yard?

(9) How many inches in $\frac{5}{6}$ of a foot?

(10) James had 45 cents; spent $\frac{1}{5}$ of his money? How much did he have left?

(11) A newsboy sold 34 Worlds and 25 Journals. How many papers did he sell?

(12) A farmer planted 8 rows of cabbages; there were 11 heads in each row. How many heads of cabbage in all the rows?

(13) At 9 cents a book, how many blank books can I buy for 63 cents?

(14) I sold 3/5 of 45 apples. How many apples did I sell?

(15) If a man is 51 years old, how old was he 23 years ago?

(16) If a horse travels 8 miles per hour, how far will he go in 9 hours?

(17) If a man earns $7 in one day, how many days will it take him to earn $49?

(18) Six pencils cost $.30. What will 9 pencils cost at the same rate?

(19) Lucy spent 64 cents for oranges. If they cost 8 cents apiece, how many did she buy?

(20) There are 48 girls in a room. If 7/8 of them are wearing aprons, how many are not wearing aprons?

Terms—Teach multiple and factor.

Multiple—A number which contains another number an exact number of times is a multiple of that number.

Factor—The factors of a number are the whole numbers whose product make the number.

Name sum multiples of 3, of 4, of 7, etc.

What are the factors of 16, 48, 32, 18, 21, etc.?

Second Week.

Written.—Writing Numbers—Same as oral work for first week.

Addition—Continued practice.

356		25,332
128	27,301	23,123
577	987	809
4,765	6,534	10,637
18,901	3,710	9,476
12,059	11,498	13,284

Subtraction—Continued practice to secure accuracy and rapidity.

25,067	7,241	$29.84	9,008	5,286	7,629
—18,959	—2,492	—12.97	—2,519	—2,394	—7,537

Multiplication—Multipliers of 3 orders, introducing zero in tens' place.

346	839	4,573	$12.90	$80.59	$92.76
×509	×306	×908	×405	×704	×906

Division—Short and Long—Long with division of two orders: 8,476 by 9; 18,396 by 12; 42,398 by 7; 34,398 by 12; $68.43 by 12; 45,060 by 8; 34,739 by 11; 34,396 by 9; 4,572 by 48; 1,356 by 32; 1,737 by 18; 2,922 by 54; 4,319 by 56; 5,848 by 72; 6,226 by 66; 1,534 by 16.

Measurement—Drawing rectangles and square of different dimensions and finding area by actual measurement. Teach term "area." Draw a square 4 inches by 4 inches. Divide into inch squares. How many?

Fractions—Reduction of easy fractions to equivalent forms, as: Change to fourths ½, 2/2, etc. Change to eighths ½, ¼, ¾, 4/4.

Addition—(1) 12½, 29¼, 63½. (2) 93½, 7¼, 5½, 95½. (3) 25½, 87¼, 96⅛, 87½. (4) 39⅜, 58½, 56¼, 98⅜, 87½. (5) 66¼, 47¾, 4½, 7⅝.

Problems—Involving two operations—(1) Mr. Smith gave his son John $24.10, James $41.03, and his daughter $34.12. How much did he give to all?

(2) Mr. Mason borrowed $4,054; repaid $2,565. How much does he still owe?

(3) If the circumference of a bicycle wheel is 8 feet, how many times will it turn in going a mile?

(4) A man buys a piano for $750, paying $525 cash. How long will it take him to pay the balance at $25 a month?

(5) A grocer bought 6 cheeses, each weighing 75 pounds. How much did he pay for them, if they were worth 15 cents a pound?

(6) A man bought a coat for $12.75 and a hat for $4.50. How much change should he get from a $20 bill?

(7) A dealer sold a carriage for $391, and gained $74.25. How much did it cost him?

(8) A street car carries 42 passengers each trip it makes. How many trips must it make to carry 4,208 persons?

(9) A grocer bought 25 pounds of Java coffee for $8.25 and sold it at $.40 a pound. What was his gain?

(10) A man paid $6½ for boots, $17¾ for a coat, $5½ for a vest. How much did he pay in all?

Third Week.

Oral.—Reading Numbers—46,098, 123,052, 84,060, 1,375,069; 869,567, 14,050, 868,459, 1,002,002, 46,375, 1,057,529.

Counting—By 8's, beginning with 1, 2, and 3—1, 9, 17, 25, 33, 41, 49, etc. 2, 10, 18, 26, 34, 42, 50, etc. 3, 11, 19, 27, 35, 43, 51, etc.

Addition—Adding any two numbers of two orders:

13	13	18	20	40	32	28	24	16	28	38	26
13	18	20	40	32	28	24	16	34	34	22	34
—	—	—	—	—	—	—	—	—	—	—	—

Subtraction—Finding difference between two numbers of two orders:

20	42	36	42	29	38
17	24	18	26	16	19
—	—	—	—	—	—

Subtract 25 from each of the following numbers: 43, 32, 56, 47, 28, 40, 36, 29, 35, 44.

Multiplication—Multiplying through 12 ×12. Rapidly multiply by 9: 2, 6, 1, 8, 4, 10, 3, 7, 12, 9, 5, 20.

Division—Separating numbers into factors—Find factors of: 16, 18, 12, 32, 30, 20, 45, 48, 56, 72, 96, 13½ 144, 24, 36, 8, 10.

Measurement—Review square inch. Teach square foot and compare.

Fractions—Finding one or more of equal parts of numbers: ⅛, ⅜, ⅝ and ⅞ of 16, 40, 32, 8, 24, 48, 56, 64. 1/7, 3/7, 4/7, 5/7 and 6/7 of 21, 28, 35, 7, 42, 49, 14, 56, 63.

Problems—(1) I bought ¾ of a yard of ribbon. How many inches were in the piece?

(2) At 48 cents a dozen, how many Roman candles can be bought for 20 cents?

(3) A farmer sold ⅔ of his flock of 60 sheep. How many had he left?

(4) How many inches in 9 feet 2 inches?

(5) I paid 40 cents for ½ yard of silk. What is the price per yard?

(6) A drover sold 9 horses at $200 each. How much did he receive for them?

(7) How many feet in 600 yards?

(8) A man paid a debt of $37 with a $50 bill. How much change did he receive?

(9) If 4 yards of dress goods cost 80 cents, how many yards can be bought for 40 cents?

(10) John has 30 marbles; his brother has 20. If they divide the whole number equally, how many will each have?

(11) If 3 apples cost 9 cents, how many can I buy for 36 cents?

(12) John has 84 marbles; George has ¼ as many. How many have they both?

(13) Mary bought a doll for 60 cents, and received 15 cents change. How much did she give the storekeeper?

(14) How many feet are there in 144 inches?

(15) Jane had 35 cents; she bought candy for 20 cents and spent the rest for apples at 3 cents apiece. How many apples did she buy?

(16) If a boy earns 25 cents a day selling morning papers and 15 cents a day selling evening papers, how much does he earn in 6 days?

(17) If coal is $7 a ton, how much must I pay for 8 tons?

(18) Five-sevenths of a class of 49 are boys; the remainder are girls. How many girls are in the class?

(19) 24 is how many times 3?

(20) How many marbles can I buy for 30 cents, if they are 2 for 1 cent?

Fourth Week.

Written.—Writing Numbers—To 1,000,000. Dollars and cents.

Addition—Continued practice, dollars and cents:

4,567				
872	1,437	6,127	$92.87	$140.27
23,958	869	5,142	1.04	3.96
36,749	10,459	4,986	183.96	12.59
483	1,268	3,735	42.06	.84
5,694	27,350	2,486	95.75	96.73
98,235	4,869	1,935	3.47	445.96

Subtraction—Continued practice. Dollars and cents:

45,659	85,398	$420.00	$842.69	43,675
—18,986	—19,379	—196.87	—16.09	—37,985

Multiplication—Short method by multiples of 10:

426	8,269	42,357	1,269	82,637
×40	×200	×90	×80	×900

Division—Long—37,396 ÷ 85; 146,003 ÷ 75; 18,349 ÷ 24; $960.50 ÷ $50; 84,398 ÷ 98.

Measurement—Area of rectangles—Find area of a pane of glass 9 inches long, 16 inches wide. Find area of a hall floor 98 feet long, 13 feet wide.

Fractions—Addition of fractions. Least common denominator, seen by inspection: (1) 34⅛, 54½, 76¾, 96¼. (2) 27½, 86½, 93¾, 93⅜. (3) 26⅜, 47⅜, 56⅝, 96½. (4) 48¾, 96½, 84½, 96¼. (5) 83⅜, 96½, 85¾, 97¾.

Problems—(1) A clerk earned in a year $998.45; he spent $746.30. How much did he save?

(2) Oranges are $.50 a dozen. How much will 156 cost?

(3) What will be the cost of one arithmetic if $30.24 is paid for 72?

(4) If a yard of velvet costs $4.60, how much will 56 yards cost?

(5) A man bought 326 sheep @ $4 each. He sold them so as to gain $125. For how much did he sell them?

(6) How many days are there in 2,136 hours?

(7) Find area of a room 15 feet wide and 30 feet long.

(8) A man owns a farm of 5 fields, respectively containing 23½, 46¼, 51⅝, 17½, 30¾ acres. How many acres in the farm?

(9) If 16 pounds of candy cost $9.60, how much will 64 pounds cost?

(10) At $2.05 each, find the cost of 309 tables.

Fifth Week.

Oral.—Reading Numbers—To 1,000,000. Dollars and cents.

Counting—By 8's, beginning with 4, 5, and 6:

4	12	20	28	36	44	etc.
5	13	21	29	37	45	etc.
6	14	22	30	38	46	etc.

Addition—Any two numbers to two orders:

57	28	46	39	22	57	34	62	93	75	49	83
36	63	42	54	69	27	46	29	38	46	64	45
—	—	—	—	—	—	—	—	—	—	—	—

Subtraction—Finding difference between two numbers of two orders:

67	64	65	85	96	26	43	85	72	49	54	63
16	23	15	23	32	12	21	25	24	14	18	27
—	—	—	—	—	—	—	—	—	—	—	—

Multiplication—Any two numbers, products to 150:

47	48	49	30	14	15	16	10	18	20	21	25
2	2	2	4	4	4	6	6	6	4	4	2
—	—	—	—	—	—	—	—	—	—	—	—

Division—The above in multiplication can also be used as a division drill. Dividing at sight.

Measurement—Teach square yard. Compare square inch, square foot and square yard.

Fractions—Finding parts of numbers through 96: 1/9, 3/9, 4/9, 5/9 and 7/9 of 18, 27, 9, 36, 45, 63, 54, 72, 81, 90,96.

Problems—(1) The drawing paper is 9 inches long and 7 inches wide. How many square inches does it contain?

(2) Henry and John together gathered 67 nuts; Henry gathered 45 of them. How many did John gather?

(3) There are 48 girls in a room. If 7/8 of them are wearing aprons, how many are not?

(4) I had $.49 and I spent $.05, $.08, $.12 and $.07. How much had I left?

(5) Elizabeth sold some carrots for 30 cents and some onions for 60 cents. If she spent 40 cents for tea and coffee, how much had she left?

(6) If I can buy 5 oranges for 9 cents, how many can I buy for 36 cents?

(7) If 3 neckties cost $1.20, how much does 1 necktie cost?

(7) What is the area in square inches of a book cover 6 inches by 5 inches?

(9) From an acre of ground 5/8 of an acre was sold. What part of an acre remained?

(10) How many inches in 3/4 of a yard?

Sixth Week.

Written.—Writing Numbers—To 1,000,000. Dollars and cents.

Addition—Continued practice: (1) 98,304, 6,144, 384, 24,576, 3,072, 945, 49,152. (2) 92,256, 67,716, 376, 947, 588, 1,504, 752. (3) $87.68, $8.95, $6.57, $8.79, $6.58, $3.95. (4) 48,976, 1,204, 96,906, 4,555, 86, 103,849. (5) $28.45, $9.07, $84.69, $986.47, $99.09, $359.67.

Subtraction—Continued practice—84,696 — 12,798; 46,398 — 27,969; 346,005 — 18,058; 15,556 — 9,998; 36,753 — 29,905.

Multiplication—Multiplier of three orders. Dollars and cents: 47,359 × 805, $69.75 × 396, $48.90 × 570, $373.59 × 574, $86,759 × 828.

Division—Continued practice in long division; divisor of two orders. Dollars and cents: 38,596 ÷ 98, 46,359 ÷ 46, 373,975 ÷ 29, $1,560.69 ÷ 57, $485.07 ÷ $.75.

Fractions—Addition of easy fractions continued, common denominator, 6: 348½, 29⅓, 148½, 57⅙. 28⅔, 47½, 29⅓, 23⅙. 48⅓, 96½, 107½, 289⅙. 48⅔, 75⅔, 129⅙, 57⅙, 26⅚, 84⅔, 29½, 176½.

Problems—Involving two operations, using denominate units and numbers learned.—(1) A dealer paid $182 for a horse; his expenses taking it to New York were $6.25; he sold it for $250. What did he gain?

(2) A grocer bought 25 pounds Java coffee for $8.25; he sold it at 40 cents a pound. What was his gain?

(3) After using 1/4 of a yard of velvet, a lady had 7/8 of a yard left. How much had she at first?

(4) A man paid $6½ for boots, $17¾ for a coat, $5¾ for a vest. How much did he pay in all?

(5) A farmer raised 1,448 bushels of wheat, which he sold at $.76 a bushel. What did he receive for it?

(6) I bought some land for $32,400 and sold it for $8,400 more than cost. What was the selling price?

(7) What is the cost of 17 pieces of cloth, each piece containing 32 yards, @ $1.50 a yard?

(8) How many yards are there in 168,423 inches?

(9) How many square yards are there in a lot 32 yards long, 17 yards wide?

(10) How many feet are there around a plot 25 feet long, 18 feet wide? Draw diagram.

Seventh Week.

Oral.—Reading Numbers—To 1,000,000. Dollars and cents: 84,396, 275,898, 18,050, 42,398, 169,098, 1,000,000, 427,696, 84,329, 84,255, 19,006.

Counting—By 8's, beginning with 7, 8, and 9:

7	15	23	31	39	47	etc.
8	16	24	32	40	48	etc.
9	17	25	33	41	49	etc.

Addition—Any two numbers of two orders:

37	23	47	38	58	69	37	92	83	55	30	53
58	18	35	44	15	23	21	18	46	16	24	34
—	—	—	—	—	—	—	—	—	—	—	—

Subtraction—Finding difference between two numbers of two orders:

45	45	92	83	22	55	30	37	53	44	85	63
30	36	10	46	18	10	24	28	24	16	56	29
—	—	—	—	—	—	—	—	—	—	—	—

Multiplication—Finding products of two numbers, products to 150:

30	31	32	34	35	40	41	42	43	44	14	15
4	3	3	2	2	2	3	3	3	5	5	5
—	—	—	—	—	—	—	—	—	—	—	—

Division—Rapidly divide 39, 30, 37, 26, 31, 25, 35, 36, 22, 48, 34, 49 by 4.

Eighth Week.

Measurement—Square inch, square foot and square yard. Review ounce and pound.

Fractions—Finding parts of numbers through 120: 1/10, 5/10, 7/10 and 9/10 of 20, 40, 10, 90, 60, 70, 30, 50, 80, 100, 90, 120.

Problems—(1) What is the difference between ¾ of 16 and ⅜ of 32?

(2) I had 21 pencils and gave away 3/7 of them. How many had I left?

(3) How many square feet are there in a piece of land 9 feet by 12 eet?

(4) If 5 coats cost $45, what will 7 coats cost?

(5) I bought a watch for $18 and sold it for $25. How much did I gain?

(6) I paid $1.44 for 12 books. How many could I have bought for 60 cents?

(7) How many days will 7 pounds of butter last, if I use ½ pound a day?

(8) A man had $.50 and spent $.27. How much had he left?

(9) How many cows @ $40 each can be bought for $800?

(10) A cow was bought for $48. How much would be gained by selling for $60?

(11) Area in square inches of a desk 18 inches long, 10 inches wide?

(12) A horse that travels 1 mile in 6 minutes goes how far in 1 hour?

Terms—Teach numerator and denominator.

Numerator—The numerator of a fraction is the number which shows how many of the equal parts are taken.

The denominator is the number which shows into how many equal parts a unit has been divided.

Unit—Any one thing.

Written—Writing Numbers—To 1,000,000. Dollars and cents.

Addition—Continued practice. Checking. (1) 26,489, 1,050, 75,367, 84,398, 9,365. (2) 8,469, 175, 9,267, 495, 8,675. (3) 849, 27, 936, 1,055, 847, 939. (4) $48.65, $3.96, $145.27, $96.34, $4.15, $846.37, $93.59, $100.48. (5) $86.75, $9.63, $47.57, $109.84, $76.75, $84.93.

Subtraction—Continued practice. Proofs. 34,398 — 1,965, 42,846 — 9,999, 84,296 — 19,849, $84.75 — $79.35, $34.00 — $19.63.

Multiplication—Continued practice: 48,369 × 506, 37,059 × 550, $48.59 × 329, $84.06 × 190, 84,675 × 12 (as a unit).

Division—Continued practice in short and long—divisor two orders: 36,496 ÷ 12, 37,963 ÷ 79, 42,906 ÷ 83, 84,398 ÷ 11, 96,379 ÷ 56. With proofs.

Ninth Week.

Measurement—Area of rectangles continued.

Fractions—Addition and subtraction of easy fractions, denominators to 8: 42½, 36⅙, 84⅔, 47½. 27½ — 16¼; 72⅝ — 63¼; 84⅔ — 56⅙; 46⅛, 84½, 96¾, 83⅝.

Problems—(1) A merchant bought 852½ yards of cloth, 756¼ yards, 2,145⅛ yards and 350 yards. How many yards in all?

(2) What is the cost of 475 tons of iron at $57 a ton.

(3) A man gave each of his nine children $3,480.60. What sum did he give all?

(4) How many inches are there in 27 feet?

(5) How many yards are there in 2,016 inches?

(6) How many square feet in a blackboard 14 feet long and 6 feet high?

(7) How many feet of molding around a room 24 feet long, 18 feet wide. Find cost @ $.04 a foot.

(8) A merchant had $12,360 in a bank; he drew out $3,475 and again put in $4,720. How much had he then?

(9) How much will 546 acres of land cost @ $240 an acre?

(10) A tub of butter weighs 40¾ pounds; the tub weighs 12½ pounds. How much does the butter weigh?

Tenth Week.

Oral.—Reading Numbers—To 1,000,000. Dollars and cents.

Addition—Adding two numbers of two orders:

33	43	53	63	17	27	37	45	28	38	39	59
18	15	12	13	11	18	19	15	7	13	15	14
—	—	—	—	—	—	—	—	—	—	—	—

Subtraction—Addition drill above may be used also as subtraction drill.

Counting—By 9's, beginning with 1, 2 and 3:

1	10	19	28	37	46	55
2	11	20	29	38	47	56
3	12	21	30	39	48	57

Multiplication—

27	35	45	25	16	25	17	19	25	25	14	17
2	3	10	4	10	3	2	3	2	10	3	5
—	—	—	—	—	—	—	—	—	—	—	—

Division—27 by 3; 40 by 10; 50 by 10; 28 by 4; 35 by 5; 42 by 6; 60 by 10; 80 by 10.

Arithmetic—5A

First Week.

Oral:—Notation and numeration. Explanation and definition of units' period. A period is one of the groups, of three figures each, counting from the units' place.

Units' Period.

2 1 5
6 6
8

The tens figures have ten times the value of the corresponding units figures. The hundreds figures have one hundred times the value of the units figures.

Units. Tens. Hundreds.

Integers, illustrations and definitions of integer, factor, prime factor. An integer is a whole number. As, 7, 1, 3, 15, 17, etc. Factors are numbers multiplied together to form a product. As, $3 \times 5 = 15$. $? \times ? = 8$. $? \times ? = 10$. $? \times ? = 25$. $? \times ? = 36$. $? \times ? = 49$. Prime numbers used as factors. As, $1 \times 3 \times 7 = 21$. $? = ? = 35$. $? \times ? \times ? = 9$.

Fractions, illustrations and definitions of proper and improper fractions. A proper fraction is a number less than one. As, ½, ⅓, ⅔, ¾, ⅕, ⅖, ⅘, ⅙, ⅚, 1/7, etc. An improper fraction is a number greater than one expressed as a fraction. As, 3/2, 5/3, 5/4, 7/5, 9/6, 10/8, 8/7, etc.

Problems—Division of a unit into any number of equal parts. Fold a sheet of paper into 2, 4, 8, 16, 32 and 64 equal parts. Fold a sheet of paper into 3, 6, 12, 24, 48 and 96 equal parts. Take one or more of these equal parts. What part, or fraction, of the whole have you taken? The denominator of a fraction shows into how many parts the unit has been divided. The numerator of a fraction shows how many equal parts have been taken.

Written—Notation and Numeration—Units' Period. Write from dictation—One hundred fifteen, nine hundred sixty-eight, fifty-four, seven, five hundred sixty-seven, etc. Copy and read—256, 73, 543, 654, 915, 844, 776, 219, 423, 96, 19, 3, 841, etc.

Integers—Prime Factors—Name the prime factors of 32, 48, 56, 81, 100. Find the prime factors of 267, 153, 882, 927, 155, 315, 495, 524, 5,724, 375, 6,039, 234, 648, 972, 1,026, 927.

Fractions—Classified as proper and improper. Classify the following fractions: 3/7, 5/6, 11/10, 1/8, 4/3, 7/4, 1/5, 15/16, 14/13, 22/20, 19/20, 47/16, etc. Write ten proper and ten improper fractions. Tell why each fraction is proper or improper.

Problems—Finding one of the equal parts of numbers. Method: ¼ of 32 = ? ¼ of 32 = 8. Abstract type: ⅛ of 176 = ? ⅞ of 144 = ? Concrete type: A grocer sells 1/9 of a box of eggs. If the box contained 288 eggs, how many did he sell?

Second Week.

Oral—Notation and Numeration. Explanation and definition of Thousands' Period.

Thousands' Period.

1 9 5, 2 1 5

Units. Tens. Hundreds.

Thousands. Ten-thousands.

Hundred-thousands.

Read the following numbers:

876,542	963,845
605,432	336,115
301,001	232,376
935,316	900,000
268,417	303,300
883,536	453,817

Integers—Method of Solving problems involving prime factors. Name the prime factors of 7, 15, 18, 8, 9, 3, etc. ? × ? = 35. ? × $8 = $56? $7 × ? = $49.

Fractions—Definition of common denominator. Method of finding common denominator. The common denominator of two or more fractions is the number showing the size of some fractional unit in which all may be expressed.

Problems—Proof that the whole equals the sum of its parts. ½ + ½ = ? ¼ + ¾ = ? ⅓ + ⅓ + ⅓ = ? ⅓ + ⅔ = ? ⅖ + ⅗ = ? ⅚ + ⅙ = ? 3/7 + 4/7 = ?, etc.

Written—Notation and Numeration—Thousands' Period. Write from dictation: One hundred sixty-two thousand; one hundred twenty thousand two hundred sixty-one; four hundred seventy-four thousand three hundred thirty-five; eight hundred fifty-three thousand seven hundred fifty. Copy and read: 938,376; 166,335; 437,385; 908,032; 840,116; 807,289; 354,225.

Integers—Prime Factors. Find the prime factors of: 102, 168, 114, 126, 165, 147, 130, 360, 448, 210, 420, 630, 1,890, 6,039.

Fractions—Common denominators—Find the common denominators of 7/8 and 3/7; 5/9 and 3/16; ¼, ⅓ and ⅘; ½, ⅚ and ⅜; 4/7 and ¾; ½, ⅚, ⅜ and ¾; 11/16, ½, ¾, ⅜.

Problems—Finding one of the equal parts of numbers—Find 1/32 of 864, 1,026, 1,988, 5,676, 8,804. A school contains 2,597 pupils in 53 classes. How many pupils are there in each class? A dozen overcoats are worth $174. Cost of 1?

THIRD WEEK.

Oral—Notation and Numeration. Explanation and definition of Millions' Period.

9 8 7, 0 1 2, 3 4 5

Millions' Period.

Units. Tens. Hundreds.

Thousands. Ten-thousands.

Hundred-thousands.

Millions. Ten-millions.

Hundred-millions.

Read the following numbers:

8,765,487	5,000,226
605,432,110	73,861,500
807,328,984	3,116,124
32,503,741	98,007,100
90,909,909	1,011,011
8,345,160	825,225,109
1,213,148	
963,768,125	

Integers—Problems involving prime factors. Name the prime factors of: 8, 9, 10, 12, 14, 16, 18, 20, 36, 24, 32, 96, 72, 84, 48, 35, 44, 45 49 and 56.

Fractions—Method of reduction to higher terms. Change: $\frac{2}{3}$ to ninths; $\frac{1}{4}$ to eighths; $\frac{3}{4}$ to twelfths; $\frac{7}{8}$ to sixteenths; $\frac{3}{5}$ to tenths. How many quarter dollars in $\$1\frac{1}{2}$?

Problems—Finding one of the equal parts of numbers—Find $\frac{1}{8}$ of 32, 48, 54, 88, 104, 144, 288. At 80 cents a pound, what will 1 ounce of mushrooms cost? What do I pay for one month's rent if my yearly rental is $480?

Written—Notation and Numeration. Millions' Period. Write from dictation: Two million one hundred thirteen; four million four thousand forty; five million five thousand five; nine hundred seven million eight hundred five thousand seventy; forty-four million ninety-three thousand eighty-four; two million five thousand one; eighty million seventy thousand sixty. Copy and read: 121,346,060; 54,228,900; 270,000,666; 251,212,100; 9,998,-876; 176,000,000; 5,222,258.

Integers—Prime Factors. Find the prime factors of: 927, 648, 375, 1,026, 645, 972, 585, 966, 625, 700, 792, 1,045, 1,146, 5,040, 7,920, 1,560.

Fractions—Reduction to higher terms. Change: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{5}{6}$ and $\frac{5}{8}$ to 144ths. Change 4/7, 7/9, 1/3, 11/18 and $\frac{5}{6}$ to 126ths.

Problems—Finding one of the equal parts of numbers. Application to concrete exercises. Use denominate numbers previously learned. A train travels 864 miles in one day. How many miles does it travel in one hour?

FOURTH WEEK.

Oral—Notation and Numeration. Blackboard review of the three periods. Read: 3,426; 3,030; 9,873; 9,103; 6,432; 7,003; 7,093; 8,300; 9,073; 8,804. Read the following grain products of the United States in 1900:

Buckwheat	9,566,966	bushels.
Wheat	522,229,505	"
Rye	23,995,927	"
Oats	809,125,989	"
Corn	999,102,516	"

Integers—Problems involving prime factors: $? \times 10$ miles $= 70$ miles. How many tons of coal at $7 a ton can be bought for $49? $? \times ? = 21$. Name the prime factors of 77, 88, 169, 121, 99?

Fractions—Method of reduction to lower terms. Change 36/48, 72/144, 8/16, 12/36, 24/32, 14/16, 9/12, 10/15, 10/12, 12/14, 16/20, 11/22, 8/24, 30/32, 30/35, 21/63 to lower terms.

Problems—Method of finding more than one of the equal parts of numbers. Find ⅔ of 24, 18, 12, 9, 30, 27, 15, 36, 39, 42, 66. Find ¾ of 40, 36, 16, 48, 32, 24, 12, 20, 8, 28. Find ⅘ of 45, 20, 30, 10, 15, 25, 40, 35, 50, 55.

Written—Notation and Numeration. The three periods. Copy and read: 637,930; 42,495,385; 26,151; 1,591,352; 115; 27,364,795; 112,100; 37,611; 83,320,872. Write from dictation: Four hundred eigthy thousand eighty; two hundred thousand ninety-eight; five hundred thousand six hundred thirty-four; ninety-six thousand four hundred forty-four; one hundred thousand one hundred; one hundred thousand one; three hundred thousand seventy-five; five hundred million.

Integers—Prime factors. Find the prime factors of 1,728, 2,600, 3,554, 10,000, 966, 5,332, 1,228, 5,102, 8,896.

Fractions—Reduction to lower terms. Change 28/144, 240/512, 60/96, 210/504, 4860/8640, 1728/5632 to lower terms.

Problems—Finding more than one of the equal parts of numbers. Abstract—2/15 of 7,590 = ? Concrete—The distance between two cities is 1,755 miles. 7/9 of the distance must be covered by rail. How many miles must be covered by rail? In an election for governor 1,500,000 votes were cast. The successful candidate received 9/15 of the total vote. How many votes did he receive?

Fifth Week.

Oral—Notation and Numeration. Relation of the orders of integers. One thousand is how many times 100? 10? 1? One is what part of 10? 100? 1,000? How many times 2 is 20? 200? 2,000 40? 400? 4,000? 60? 600? 6,000? 80? 800? 8,000? Two is what part of 20? 200? 2,000? 40? 400? 4,000? 60? 600? 6,000? 80? 800? 8,000?

Integers—Illustrations and definition of common factors. Method of finding common factors. A common factor of two or more numbers is a number that is a factor of each of them. Find the greatest common factor of 15 and 20; 17 and 34; 12 and 24; 14 and 28; 4, 12 and 36; 24, 32 and 48; 22, 33 and 44; 14, 21 and 28; 72 and 96; 48 and 56; 7, 21 and 49; 8, 48 and 56.

Fractions—Problems involving classification and reduction of fractions. Change 22/4, 14/4, 34/10, 24/9 to improper fractions in lowest terms.

Problems—Finding more than one of the equal parts of numbers. Find 5/7 of 35, 49, 147, 784, 91, 133, 224.

Written—Notation and Numeration. Relation of the orders of integers. Write from dictation and add: 8 units; 6 tens 6 units; 2 hundreds 4 tens 9 units; 8 thousands 3 hundreds 7 tens 4 units.

Integers—Common Factors. Find the greatest common factors of: 15, 20 and 25; 38, 76 and 114; 32, 48 and 112; 30, 90 and 150; 245, 115 and 550; 18, 36 and 50; 44, 66 and 88.

Fractions—Classified as proper and improper. Common denominators. Reduction to higher and lower terms. Change 90/126, 51/85, 70/196, 105/225, 85/133, 49/343 to lower terms. Find the common denominator of 5/18, 1/36, 4/9, ¼, ⅔. Change to 24ths: ⅚, ⅜, ⅔, ½, ¾.

Problems—Finding more than one of the equal parts of numbers. Find 11/32 of 6,496, 30,816, 160,000, 32,000,000. A house insured for $86,400 burned down. The owner collected ⅚ of the insurance. How much did he collect? The population of New York State is about 7,500,000. 27/50 are females. How many females are there in New York State?

Sixth Week.

Oral—Notation and Numeration. Relation of the orders of integers. Three thousand is how many times 300? 30? 3? Three is what part of 30? 300? 3,000? How many times 3 is 60? 600? 6,000? 90? 900? 9,000? Three is what part of 60? 600? 6,000? 90? 900? 9,000? How many cents in 3 dollars, 3 dimes and 3 cents?

Integers—Problems involving common factors. Find the greatest common factors of 2, 14; 15, 45; 2, 14, 16, 20; 10, 20, 30, 40; 15, 45, 60; 14, 28, 56; 6, 9, 15, 18; 8, 24, 48; 9, 18, 27, 72; 5, 20, 15, 60.

Fractions—Method of changing whole numbers to improper fractions. How many eighths in 7, 12, 11, 16, 20, 10, 15, 13? Change 15 to halves, thirds, fourths, fifths, sixths, etc. Change to halves, thirds and fourths: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, etc.

Problems—Finding more than one of the equal parts of numbers. If a pound of butter cost 32 cents, what will 4 ounces cost? Find ¾ of $40, ⅚ of 30 feet, 3/7 of 28 miles, ⅖ of 45 pounds, ⅜ of 24 ounces, 4/9 of 27 dozen, 5/7 of $35, ⅝ of 48 yards, 7/9 of 63 gallons.

Written—Notation and Numeration. Relation of the orders of integers. Write from dictation and add: One million one thousand one; two hundred twenty-two; five hundred thousand five hundred five; ninety-nine; six hundred sixty-six million six hundred sixty-six thousand six hundred sixty-six.

Integers—Common Factors. Find the greatest common factors of: 18, 27, 48; 25, 35, 5, 50; 125, 75, 200; 150, 50, 375; 24, 36, 72; 625, 50, 175; 180, 80, 40; 19, 38, 76; 75, 45, 60; 46, 92, 23; 18, 144, 72.

Fractions—Whole numbers to improper fractions. Change 96 to twelfths. Change 257 to sixteenths. Change 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 to 11ths, 12ths, 13ths, 14ths, 15ths, 16ths, etc.

Problems—Finding more than one of the equal parts of numbers. Find the cost of 240 sacks of salt at $⅞; 360 pounds of meat at $3/16; 800 dozen eggs at $⅜; 1,200 bushels corn at $5/9; 720 boxes grapes at $7/12.

Seventh Week.

Oral—Notation and Numeration—United States money. Table of United States money. Fractional parts of a dollar. Table—10 mills = 1 cent, 100 cents = 1 dollar, 1 dime = 10 cents, 1 eagle = 10 dollars. Learn 6¼ cents = 1/16 of $1, 8⅓ cents = 1/12 of $1, 12½ cents = ⅛ of $1, 16⅔

cents = 1/6 of $1, 25 cents = 1/4 of $1, 33 1/3 cents = 1/3 of $1, 37 1/2 cents = 3/8 of $1, 50 cents = 1/2 of $1, 62 1/2 cents = 5/8 of $1, 66 2/3 cents = 2/3 of $1, 75 cents = 3/4 of $1, 87 1/2 cents = 7/8 of $1.

Integers—Problems involving common factors—Find the greatest common factors of 27 and 48, 25 and 35, 36 and 54, 26 and 39, 42 and 63, 34 and 51, 32 and 48, 45 and 75, 40 and 65, 54 and 69, 10, 5 and 20; 12, 8 and 24; 16, 32 and 48.

Fractions—Method of changing mixed numbers to improper fractions. Reduce to improper fractions: 2 1/2, 5 1/3, 7 1/2, 12 1/2, 2 1/4, 5 3/4, 7 3/5, 9 4/5, 4 5/6, 8 4/7, 8 7/8, 10 5/9.

Problems—Finding more than one of the equal parts of numbers. Find the cost of 3/4 pound candy at 60 cents, 2/3 yard ribbon at 36 cents, 5/6 dozen oranges at 24 cents, 2/9 yard lace at 45 cents, 7/8 lb. butter at 40 cents.

Written—Notation and Numeration. Dollars and cents. Fundamental operations with dollars and cents. Add $202.97, $42.23, $453.60, $7.18, $63.54, $0.37, $83.61, $523.00 $23.04, $0.86, $35.82, $584.60. Subtract—$1,000.00 — $876.49; $549.37 — $99.89; $345.93 — $76.04; $1,786.08 — $1,097.19; $345.00 — $187.23; $3,545.37 — $966.38. Multiply—Cost of 197 bbls. flour at $5.66; 486 bushels wheat at $1.04; 237 tons plaster at $6.72; 809 tons hay at $11.45; 99 pounds butter at $.24. Divide—At $2.75 per day, how long will it take a man to earn $110? How many yards of muslin, at 12 cents per yard, can be bought for $126? Cost of 1 book if 1 dozen cost $156.84?

Integers—Common Factors. Find the greatest common factors of 144, 288 and 1,728; 12, 36 and 90; 20, 100 and 1,000; 150, 75 and 300.

Fractions—Mixed numbers to improper fractions. Reduce to improper fractions: 14 5/8, 18 4/5, 25 11/24, 36 5/9, 28 9/28, 42 6/7, 45 15/19, 19 21/25, 375 11/16, 86 3/11.

Problems—Finding more than one of the equal parts of numbers. A business valued at $80,000 was owned by four partners, each having a share of 7/16, 5/16, 3/16 and 1/16 respectively. Find the cash value of each partner's share.

Eighth Week.

Oral—Notation and Numeration—Problems involving dollars and cents. What part of $1 is 1 cent? 1 dime? 1 quarter? 1 nickel? 1 mill? How many cents in $3.75? $2.50? $4.86? $1.19? Cost of 72 articles at 12 1/2 cents, 33 1/3 cents, 16 2/3 cents, 25 cents, 50 cents, 37 1/2 cents, 62 1/2 cents, 87 1/2 cents, 66 2/3 cents and 75 cents each. At 12 1/2 cents per yard, how many yards for $1, $2, $3, $10, $20, $25? At 33 1/3 cents per pound, how many pounds for $1, $2, $3, $10, $20, $25? Cost of 16 pounds at 12 1/2 cents, 36 yards at 8 1/3 cents, 42 pounds at 16 2/3 cents, 40 bushels at 12 1/2 cents, 15 feet at 33 1/3 cents, 48 dozen at 6 1/4 cents, 84 bushels at 50 cents, 40 yards at 37 1/2 cents, 24 bushels at 62 1/2 cents, 18 yards at 66 2/3 cents, 60 barrels at 75 cents.

Integers—Problems involving common factors. Find the greatest common factors of 2, 4, 10, 12; 10, 25, 40, 50; 6, 18, 30, 24; 16, 32, 40, 8.

Fractions—Method of changing improper fractions to whole numbers.

Change to whole numbers: 10/2, 18/3, 24/4, 35/5, 48/6, 63/7, 64/8, 72/9, 100/10, 121/11, 108/12, 26/13, 42/14, 75/15, 128/16, 51/17, 54/18.

Problems—Finding more than one of the equal parts of numbers. Find the cost of ¾ pound meat at 24 cents, ⅔ gallon wine at $1.80, ⅞ yard silk at $2.40, ½ dozen coats at $3.50, 1/16 pound at $3.20.

Written—Notation and Numeration. Dollars and cents. Cost of articles. Cost of 687 pounds at 4 cents, 976 yards at 6 cents, 938 coats at $7, 695 pounds at 20 cents, 12 bushels at $1.43, 11 sheep at $7.47, 9 tons at $22.75, 13 sacks salt at $1.11, 352 yards at 12½ cents, 1,728 hats at 50 cents, 933 yards at 33⅓ cents, 2,504 dolls at 25 cents, 248 pounds at 75 cents, 186 pounds at 33½ cents, 8 barrels at $16.37½, 16 gallons at $3.62½, 124 bushels at $1.50, 96 pounds at $1.25, 120 gallons at $2.33⅓, 64 sacks at $1.12½.

Integers—Common factors—Find the greatest common factors of 10, 50, 100, 1,000; 250, 500, 1,000, 2,000; 476, 354, 942, 72.

Fractions—Improper fractions to whole numbers. Change 35,000/100, 3,600/15, 192/16, 625/25, 720/36, 880/22, 1,539/9, 24,036/12, 96/16 and 715/13 to whole numbers.

Problems—Finding more than one of the equal parts of numbers. Application to concrete exercises. Use denominate numbers previously learned. A man receives a salary of $1,800 a year. He pays 3/20 of his salary for board, 3/16 for clothing and 4/15 for other expenses. What are his yearly expenses? Cost of 240 pounds coffee at $.28 4/7 a pound.

Ninth Week.

Oral—Notation and Numeration. Relation of fractions to mixed numbers. Show that the fraction ½ equals ⅕ of the mixed number 2½. 2½ = 5/2. When the denominators are the same, the numerator of a fraction divided by the numerator of a mixed number changed to an improper fraction, shows the relation of the fraction to the mixed number.

Integers—Problems involving prime and common factors. Name the prime factors of 14, 22, 16, 18, 11, 15, 20, 33, 9, 8, 12, 17, 49, 6, 5, 100, 75, 34, 30, 10. Name the greatest common factors of 6, 9, 12; 8, 12, 20; 12, 15, 18; 10, 15, 25; 15, 18, 30; 18, 24, 30; 12, 15, 21; 21, 28, 35; 18, 27, 45; 22, 33, 55; 24, 32, 40; 24, 36, 60.

Fractions—Method of changing improper fractions to mixed numbers. Change 5/2, 13/2, 29/3, 21/4, 12/5, 51/6, 44/7, 45/8, 48/9, 75/10, 100/11, 99/12, 70/13.

Problems—Review. Finding one or more of the equal parts of numbers.

Written—Notation and Numeration. Relation of fractions to mixed numbers. ½ is what part of 7½, 19½, 25½, 37½, 50½? ⅓ is what part of 3⅓, 4⅔, 8⅓, 15⅔, 22⅓? ⅔ is what part of 6⅓, 10⅔, 36⅔, 14⅔, 88⅓? ¾ is what part of 25¼, 66¾, 95¼, 115¾, 75¼?

Integers—Prime and common factors. Name the prime factors of 100, 56, 54, 60, 63, 48, 81, 144, 96, 84, 88, 175, 225, 316, 420, 266. Find the greatest common factors of 32, 66, 48, 56; 4,900, 8,100, 3,600; 2,500, 400, 200; 99, 88, 121, 22.

Fractions—Improper fractions to mixed numbers—Change to mixed numbers 520/41, 425/31, 419/26, 198/19, 312/22, 1,000/45, 976/35, 883/64, 526/32, 10,015/19.

Problems—Finding one or more of the equal parts of numbers. Application to concrete exercises. Use denominate numbers previously learned. It costs $50,000 to construct a mile (320 rods) of road. How much will it cost to construct 40 rods? A train travels 844 miles in 2 days. How many miles does it travel in 20 hours?

TENTH WEEK.

Oral—Notation and Numeration. Relation of mixed numbers to fractions. Show that the mixed number 2½ equals five times the value of the fraction ½. 2½ = 5/2. When the denominators are the same the numerator of the mixed number changed to an improper fraction divided by the numerator of the fraction, shows the relation of the mixed number to the fraction.

Integers—Problems involving prime and common fractions. Review.

Fractions—Illustration of principle involved. Principle: Multiplying or dividing both numerator and denominator by the same number does not alter the value of the fraction. Multiply the following fractions (numerators and denominators) by 2, 3, 4, 5, 6, 7, 8, 9 and 10: ½, ⅔, ⅓, ¼, ¾, ⅕, ⅖, ⅗, ⅘, ⅙, ⅚, 1/7, 2/7, 3/7, 4/7, etc. Reduce the results of your multiplication to lowest terms and compare with the original fractions.

Problems—Finding one or more of the equal parts of numbers. Review.

Written—Notation and Numeration. Relation of mixed numbers to fractions. 7½, 19½, 25½, 37½, 50½, etc., are how many times ½? 3⅓, 4⅔, 8⅓, 15⅔, 22⅓, etc., are how many times ⅓? 6⅓, 10⅔, 36⅔, 14⅔, 88⅓, etc., are how many times ⅔? 25¼, 66¾, 95¼, 115¾, 75¼, etc., are how many times ¾?

Integers—Prime and Common Factors. Review.

Fractions—Application of principle involved. Multiply the numerators and denominators of the following fractions by 12, 16, 20, 25, 28, 30, 32, 36, 40, and 45: ¾, 11/20, ⅚, 17/30, 23/45, 7/12, ⅝, 4/7, 14/15, 9/16. Reduce the results of your multiplication to lowest terms and compare with the original fractions. What principle does your work prove to be true?

Problems—Finding one or more of the equal parts of numbers. Application to concrete exercises. Use denominate numbers previously learned. Review.

Arithmetic—5B

FIRST WEEK.

Oral—(1) One fourth equals how many eighths? (2) Three fourths are equal to how many eighths? (3) One half plus one eighth are how many eighths? (4) One fourth plus one eighth are how many eighths? (5) One half plus three eighths are how many eighths? (6) One half minus one eighth are how many eighths? (7) One fourth minus one eighth are how many eighths? (8) Three halves minus three-eighths are how many eighths?

Written—(a) Problems involving fundamental operations—(1) A man buys $60 worth of cloth. He sells four pieces of this at $8 each and four

more at $16 each. His agent receives $3 for making the sale. What profit does the man make? (2) Eight pounds of tea costing 32 cents a pound are mixed with 14 pounds costing 46 cents per pound. For what must the 22 pounds be sold so as to yield a profit of 6 cents per pound?

(b) Notation and Numeration—2 periods—325,209; 800,080; 8,008.

(c) Addition and subtraction of common fractions—(1) The walking club in a school made 8⅕ miles on Saturday, 6⅓ miles on Sunday, 7½ miles on Monday, 4⅔ on Wednesday. How many miles in all. (2) From 94 take 5⅙. (3) From 56 take 3 4/7. (3) From 1,894 take 26 1/9.

(d) Change mixed number to improper fraction and *vice versa.*

SECOND WEEK.

Oral—(1) Three times one eighth are how many eighths? (2) Three times two eighths are how many eighths? How many fourths? (3) How many eighths are there in one fourth? In three fourths? (4) One fourth of an inch minus one eighth of an inch is what part of an inch? What part of a foot? (5) Three times three eighths of an inch are how many eighths? How many inches? (6) Three times five eighths of an inch are equal to how many eighths? How many inches? (7) Three eighths of an inch are contained in twenty-one eighths of an inch how many times? How many times in two inches and five eighths?

Written—(a) Fractions. Rapid review of (1) reduction to lowest terms, (2) reduction to least common denominator, (3) reduction to mixed numbers, (4) reduction of mixed number to improper fractions, (5) addition, and (6) subtraction. (1) Reduce to lowest terms 3/15, 9/21, 18/60, 72/100. (2) Reduce to least common denominator ¾, 7/9, 5/18. (3) Reduce to mixed numbers, 14/5, 81/2, 19/4, 72/5, 18/7. (4) Reduce to improper fractions 8⅜, 9 7/9, 10 5/11. (5) Add ⅓ + ⅚ + 92½ + 7 3/19. (6) Find the difference between 6/19 and ⅔. (7) Draw a line. Mark it off into sixths. Show what is meant by ⅚ of the line. (8) What is the cost of 16½ acres of land at $52 an acre?

(b) Notation and Numeration—3 periods—(1) Express in numbers seven million, twenty thousand and 16. (2) Read 437,006,010. (3) Express in numbers, four hundred and sixteen thousand, fifty-five and three hundredth.

THIRD WEEK.

Oral.—(a) Approximate Answers—(1) What will 49⅞ pounds of tea cost at 50 cents a pound? (Nearly 50 pounds at 50 cents. The cost is nearly what?) (2) A man has 4,800 pounds of sugar which he wishes to put into barrels containing 198 pounds each. About how many barrels will he need? (3) Merchant bought a barrel of oil containing 43⅞ gallons and paid 9 cents a gallon. About how much did it cost? (4) At the rate of 3 apples for 7 cents, what will be the cost of 2 dozen apples? (5) A gross is 12 dozen. What is the cost of ⅛ of a gross of pencils at 2 cents each?

Written.—(a) Multiplication of Fractions—(1) Whole number multiplied by fraction; (2) fraction multiplied by fraction; (3) mixed number multiplied by fraction; (4) mixed number multiplied by whole number; (5) mixed number multiplied by mixed number.

(1) $46 \times \frac{1}{2} = ?$ $37 \times 4/19 = ?$ $56 \times 3/28 = ?$ $8/19 \times 45 = ?$ (2) $7/38 \times 4/17 = ?$ $4/15 \times 8/9 = ?$ $8/9 \times 4/15 = ?$ $7/16 \times 2/49 = ?$ (3) $46 \times 9\frac{1}{2} = ?$ $9\frac{1}{2} \times 46 = ?$ $5{,}534 \times 408\frac{1}{2} = ?$ (4) $38\frac{2}{3} \times \frac{5}{6} = ?$ $47\ 2/9 \times 7/16 = ?$ $48\ 5/9 \times 3/28 = ?$ (5) $47\ 9/16 \times 28\frac{2}{3} = ?$ $57\frac{3}{4} \times 4\ 8/21 = ?$

(b) Teach reading of decimals of three, four and five orders—(1) Express in figures four hundred twenty eight thousand, sixty-four and 19 ten thousandths. (2) Read 384,206.10027.

(c) Short Cuts—Teach multiplying by 25 and 250. Review multiplying by 50 and 100. (1) $34 \times 25 = ?$ (2) $45 \times 250 = ?$

Fourth Week.

Oral.—(a) Approximate Answers—(1) Sold 6 pieces of cloth, 34 yards to each piece, at $2.00 per yard. Give the amount of the bill in round numbers.

(b) Review Problems—(1) $15 \times 5 - 12 + 4 = ?$ (2) How many 8's in $2 \times 17 \times 2$? (3) 12 times 9 are how many times 3×3? (4) William has 75 cents. He bought a bat for 45 cents and spent the rest on oranges, paying 5 cents for two oranges. How many oranges did he buy?

Written.—(a) Division of Fractions—(1) Whole number as divisor, fraction as dividend; (2) whole number divided by fraction; (3) fraction divided by fraction; (4) fraction divided by mixed number and vice versa; (5) mixed number divided by mixed number. (1) $\frac{3}{4} \div 3 = ?$ $\frac{1}{2} \div 6 = ?$ $4/19 \div 31 = ?$ $\frac{5}{6} \div 27 = ?$ (2) $3 \div \frac{3}{4} = ?$ $6 \div \frac{1}{2} = ?$ $31 \div 4/19 = ?$ $27 \div \frac{5}{6} = ?$ (3) $\frac{5}{6} \div \frac{3}{4} = ?$ $8/19 \div 4/11 = ?$ $5/16 \div 3/32 = ?$ $4/27 \div 2/81 = ?$ (4) $3\frac{1}{3} \div \frac{3}{4} = ?$ $5\frac{7}{8} \div 6/15 = ?$ $6/15 \div 5\frac{7}{8} = ?$ $\frac{3}{4} \div 3\frac{1}{3} = ?$ (5) $85\frac{2}{5} \div 3\ 4/9 = ?$ $47\ 2/17 \div 3\ 4/9 = ?$ $3\ 4/9 \div 5\frac{1}{6} = ?$ (6) How much does a man earn in a day if his monthly salary for working twenty-five days is $\$59\frac{1}{2}$? (7) $3\frac{5}{6} \times$ what number $= 8\frac{4}{5}$? (8) A man packed 1,400 pounds of tea into boxes, each box holding $38\frac{3}{4}$ pounds. How many boxes did he fill? How many pounds were left over? (9) When sugar costs $\$8\frac{3}{8}$ a barrel, how many barrels can be bought for $67.00? (10) $(43\ 5/9 \times 6/7) + (49\ 3/17 \div 16\frac{1}{2}) = ?$

(b) Principles involved in special drills in addition, subtraction, multiplication and division—(1) $61 + 39 = 61 + 30 + 9$. $29 + 94 = ?$ $86 + 48 = ?$ (2) $134 - 75 = 134 - 70 - 5$. $68 - 42 = ?$ $165 - 83 = ?$ (3) $49 \times 3 = (40 \times 3) + (9 \times 3)$. $86 \times 4 = ?$ $55 \times 4 = ?$

Fifth Week.

Oral—(a) Special Drills—(1) $84 + 95 = ?$ $(84 + 90 + 5)$ (2) $67 - 13 = ?$ (3) $149 + 320 = ?$ (4) $46 + 97 = ?$ (5) $250 + 390 = ?$

(b) Problems—(1) I paid 18 cents for $1\frac{1}{2}$ pounds of fat. What will 6 pounds cost? (2) Cloth costs $\$1\frac{1}{4}$ a yard. How many yards can I buy for $10? (3) Three caps cost 93 cents. What do 2 caps cost? (4) Three men can do a piece of work in 8 hours. How long would it take one man to do it? How long would it take 4 men to do it?

Written.—(a) Reduction of common fractions to decimals and of deci-

mals to common fractions—(1) Express 487¼ decimally. (2) Express 45/50 decimally. (3) Express 3 9/18 decimally. (4) Reduce .15 to a common fraction. (5) Change 84.16 to a mixed number, expressing the fraction in its lowest terms. (6) Which is more and how much, 8/15 or .45? (7) Find the difference between 9⅔ and 17.75. (8) What is the sum of 6½, 417.9, 846.03, and 47/50? (9) After spending .75 of his money, a man had $4 left. How much had he at first?

Sixth Week.

Oral—(a) Problems involving multiplication and division of fractions—(1) A man divided a sum of money equally among 6 children. Each child received $2½. How much money did he give them? (2) How many bags of salt, each containing 4½ pounds, can be filled from a box which holds 27 pounds? (4) A man pays 8 cents for a dozen apples. What would he have to pay for 27 apples?

Written.—(a) Principle: The product of two or more numbers is equal to the product of all the prime factors of the numbers. $25 \times 6 = 5 \times 5 \times 2 \times 3 = 150$.

(b) Fractions—four operations—(1) $(3\frac{2}{3} \times 4\frac{1}{2}) - 10\frac{1}{4} = ?$ (2) $(14\ 3/7 \times 7) - (9 \times 10\frac{7}{8}) = ?$

(c) Decimals—Reduction of decimals to common fractions and of common fractions to decimals. Continued drill in notation and numeration of mixed numbers, consisting of two orders of whole numbers and decimals to four and five places. Equivalents to decimals of halves, quarters, fifths, tenths. $1/10 = .10$ $\frac{1}{2} = .50$. $\frac{3}{4} = .75$. $\frac{1}{5} = .20$. $3/2 = 1.50$. $5/4 = 1.25$, etc.

(d) Problems—(1) A drover buys 64 sheep for $450. He sells ¼ of them at $8½ each, and the remainder at $9⅓ each. How much money does he gain? (6) A man sold 56 yards of cloth for $140, gaining $28. What did it cost him per yard?

Seventh Week.

Oral.—(a) Finding number when fractional part is given—(1) Two thirds of a yard of cloth costs $2. What does a yard cost? (2) Three fourths of the members of a club attended a meeting. Twenty-four members attended the meeting. How many members in the club? (3) ¾ of the members of a club were present; 12 members were absent. What is the membership of the club? (4) A man sold ⅖ of his land and had 60 acres left. How much had he at first? How much did he sell? (5) After spending ⅚ of his money, a man had $15 left. How much money did he spend?

Written.—(a) Fractions—(1) Finding fractional part of a number; (2) finding number when fractional part is given; (3) finding multiples of a number when fractional part is given; (4) finding fractional part when another fractional part is given.—(1) A man left $6,000 to be distributtd among four children, one of whom receives ⅓, another ¼, another ⅕, and the last the remainder. How much money did each child receive? What part of the money did the fourth one receive? (2) Three fifths of the children in a school were assembled; 1,839 children were assembled. How many chil-

dren in the school? What part of the total number of children were absent from the assembly? (3) 5/6 of a yard of cloth costs $10. What must a man pay for 6 yards? (4) 5/6 of a yard of cloth costs $10. What must I pay for 3/4 of a yard?

Eighth Week.

Oral.—(1) If a tailor needs 3/4 of a yard of cloth to make a vest, how many vests will he make with 6 yards? (2) A man has $50 and spends 1/4 of it. How many dollars has he left? (3) A boy spends 2/3 of his money and has 18 cents left. How much money had he at first? (4) 780 + 260 = ? (5) 59 — 23 = ? (6) 53 — 29 = ? (7) 250 × 16 = ? (8) Silk sells at $1.25 a yard. How many yards can I buy with $7 1/4? (9) A man earns $2 3/4 per day. What does he earn in two weeks, counting 6 working days to the week? (10) A yard of silk costs $2 1/4. What part of a yard can I buy for $1? What part can I buy for $1/4?

Written.—(a) Fractions—Problems—(1) Coffee costs 36 1/2 cents a pound. What is the cost of 94 1/2 pounds? (2) Coffee costs 37 1/2 cents a pound. How much coffee can I buy for $120? (3) Two-thirds of the land in a farm costs $6,234. What is the cost of 3/5? (4) A man put 80 2/3 bushels of oats into bags holding 3 2/3 bushels each. How many bags were required?

(b) Decimals—Continued drill in notation and numeration; reading and writing from dictation mixed numbers of three orders and three, four and five decimal places. Reduction of common fractions to decimal fractions and vice versa.—(1) Change .035 to lowest terms. (2) Change 14/25 to a decimal fraction. (3) Reduce 1.046 to an improper fraction and then find the value of 2/3 of this fraction. (4) Following the method suggested in example (3), perform the operation indicated: 9.28 × 5/6 = ? .0436 ÷ 3/5 = ? 8.14 × 6.12 = ?

Ninth Week.

Oral.—(1) 1/8 of a dollar equals how many hundredths? How many cents? (2) 1/5 of a dollar are how many cents? 1/6 ? 1/4 ? 1/3 ? 1/10 ? 1/100 ? 4/100 ? 7/10 ? 3/4 ? 4/5 ? (3) What is the sum of 2 and .2? (4) What is the sum of 3.2 and .4? (5) What is the sum of 6.5 and 3.05? (6) What is the sum of 8, 14, 9.5 and 3 1/2? (7) Add 6 1/2, 2.25, 28, 12, 6 1/2.

Written.—(a) Addition of Decimals—(1) Add 32.067, 549.028, 2.0096, 43.5, 8,734.2, 95.0164, 82.012. (2) Find the sum of the following and express the answer in decimal form: 23 1/5, 926.053, 428.0672, 84.27, 3/4. (3) The four sides of a lot measure 97.35 feet, 48.66 feet, 89.6 feet, and 32.25 feet. How long is the fence which encloses it?

(b) Finding number when decimal part is given—(1) William spends 18% of his money, which is 36 cents, on a bat. How much has he left? (2) Find the number .23 of which is 369. (3) A man pays $2.25 for .9 of a barrel of flour. What would he have to pay for three barrels? (4) Sold a house for .60 of the cost of house and barn, and received $2,412. What was paid for the house and barn?

(c) Teach meaning of terms "abstract number" and "concrete number."

(d) Review multiplication and division of fractions.

TENTH WEEK.

Oral.—(a) Equivalents in hundredths of eighths, fifths, tenths, thirds, sixths and twelfths.

(b) Review addition. Teach subtraction of decimals.—(1) .50 — .25 = ? (2) .50 — .47 = ? (3) .5 — .47 = ? (4) 1.8 — .6 = ? (5) 1.6 — .6 = ? (6) 1.6 — .8 = ? (7) 8.3 — 8 = ? (8) 8.3 — 8.2 = ? (9) 8.3 — .2 = ? (10) 8.3 — .02 = ? (11) 8.3 — 8.02 = ? (12) 9 — .02 = ?

(c) Problems—(1) What part of a dollar does a boy lose by selling for $.30 a pair of skates for which he paid $1.10? (2) A man paid $1⅗ for a hat and $3¼ for a pair of shoes. What change does he receive upon offering a five-dollar bill in payment?

Written—(a) Continue examples in addition of fractions and decimals. Subtraction of decimals.—(1) From .5 take .035. (2) From .09 take .034, .0064, .025, .019. (3) One man owns .35 of the property in a corporation. What part do the other people own? (4) A French franc is worth 19 3/10 cents. What is the difference in value between five francs and $2?

(b) Problems—(1) Bought 87 heads of cattle at $32 apiece. Sold them so as to gain $7 on each head. What did I receive for all? (2) Bought 87 heads of cattle at $32 apiece. Sold them so as to gain ¼ of the cost. What was the cost? (3) Bought 3 pounds of roast beef at 24 cents a pound, 2 quarts of onions at 12½ cents a quart, 1½ dozen apples at 12 cents a dozen, 4 quarts of milk at 7½ cents a quart. What change do I get from a $5 bill?

Arithmetic—6A

FOURTH WEEK.

Monday—Oral.—(1) What is the sum of 6.3 plus 1½ plus 17.4 plus 9½? (2) How many pounds are 48 ounces? (3) From ⅔ of 18 take 9½. (4) 5½ is ½ of what number? (5) ¾ of 24 + 6½ = ? (6) How many hours in two days?

Written.—(1) Add 468⅖, 829.7, 43.0008, 324.0126, 25,632, 38⅕. (2) A man borrows $600.00. He pays 4% a year for the use of it. How much does he have to pay for using the money 1 year? (3) Which is more and how much, 3 bushels, 1 peck, 1 quart or 92 quarts? (4) (¾ × 2/9 × 28) + 98⅔ = ? (5) 18% of 3462 equals ?

Tuesday.—Oral.—(1) ¾ × 3 = ? (2) ¾ ÷ 3 = ? (3) ¾ × ⅓ = ? (4) ¾ ÷ ⅓ = ? (5) Multiplying the numerator as in examples (1) (4) does what to value of fraction? Multiplying the denominator as in example (3) does what to the value of a fraction? (6) How many minutes in 3½ hours?

Written.—(1) A farmer owned 1408 sheep and sold 6¼% of them. How many did he sell? How many remained? (2) From .85 of $725 take 7/9 of this sum. (3) Find 29% of 3280. (4) A school has 1824 pupils; 66⅔% are girls. How many boys? (5) Find the sum of 83 2/9, 346⅕, .009, 2847, 36 2/25.

Wednesday—Oral.—(1) 33⅓% of 120 = ? Of 90 = ? Of 45 = ? Of 300 = ? (2) 66⅔ of 120 = ? Of 90 = ? Of 45 = ? Of 300 = ?

(3) Find the difference between 50% of 42 and 33⅓% of 45. (4) How many miles does a train moving at the rate of two miles in three minutes cover in two hours? (5) $\frac{5}{6} \div \frac{2}{3} = ?$

Written.—(1) Find the quotient of .35 of 672 divided by ⅜ of 4/6 × 2½. (2) Perform without resorting to decimals: 33⅓% of 291, 8⅓% of 4896, 16⅔% of 9774. (3) 38.406 × 95.023 = ? (4) .0876 ÷ 27 = ? (5) Mr. Edward Blake of 38 E. 52nd Street, New York, pays his landlord, Henry Townly, $38.00 on Feb. 1, 1913, as rental for the month of February. Make a copy of the receipt which Mr. Blake received from Mr. Townly.

Thursday—Oral.—(1) Express decimally ⅔, ⅕, ¾, 4/3, ⅗. (2) Write as % ⅔, ⅕, ¾, 4/3, ⅗, 6½. (3) From ⅖ of 60 take 66⅔% of 30. (4) $2 are what part of $12? What % of $12? (5) How many ounces in 6¼ pounds?

Written.—(1) Find the value of 8348 + 967⅔ + 3/11 + 4622.05 + 92.006. (2) A man bought 240 barrels of sugar, paying 5½ cents a pound. Each barrel contains 212 pounds of sugar which is sold at 7 cents a pound. Total gain? (3) 45% of $6425.00 = ? (4) 3/9 × 17⅔ ÷ 6½ = ? (5) The month of January contains 26 working days. A man works 8 hours during each of these days, receiving 72 cents an hour. How much does he earn during this month?

Friday—Oral.—(1) 40 boys in a class; 2 are absent. What part are absent? What %? (2) A man had $75 and spent 33⅓% of it. How many dollars had he left? (3) ¾ of ⅘ = ? (4) Express the answer to example (3) as a %. (5) Add 38, 7½, 3½, 9 2/5, 2/5, 7.

Written.—(1) 8.0067 ÷ 94½ = ? (2) From 5/9 of 10899 take 11 1/9% of the same number. Perform this example employing one operation only. (3) 86% of $328.00 = ? (4) Find ⅔ of 75% of $4324.00. (5) Six schools enter a series of ball games. The winning school won 12 games, two of the others 9 games each, one school 7 games, and the others 2 games each. Express in % the standing of each school as based on the number of games won.

Fifth Week.

Monday—Oral.—(1) ½ of anything is how many hundredths of it? What %? (2) What % of a thing is ¼ of it? 1/10? ⅕? 1/20? 1/25? (3) What % of a number is ⅙ of that number? ⅓? ¾? ⅘? (4) 67% of the contents of a barrel was emptied. What % remained? (5) A class grew till its pupils were 1½ times as many in number at the end of the term as in the beginning of the term. What was the % of increase?

Written.—(1) 12 yards of cloth cost $36.84. What is the cost of 19 yards? (2) What part of 35 barrels are 5 barrels? What %? (3) 7 bushels are what % of 8.5 bushels. (4) Bought 9 dozen hats at $15.50 per dozen. Sold at a gain of 22%. Total gain? (5) ⅔ × 19½ ÷ 6⅓ = 100%. Find 50%.

Tuesday—Oral.—(1) 97⅛ % of the pupils of a school were present. What % were absent? (2) Of three partners, one owns ½ of the capital and a second owns ⅓ of the capital. What % does the third partner own? (3) Sold ⅓ + ⅕ + 2/15. What % remained unsold? (4) A man who

owns 4/5 of a farm sells 66⅔% of his share. % of farm left? (5) A man who owns 4/5 of a farm sells 66⅔% of the farm. What % of the farm does he still own?

Written.—(1) Paid $135 for 45 hats. What is the cost of 6 dozen at the same rate? (2) A plot of land is 185 feet long and 75 feet wide. What % of the length is the width? (3) In example (2) what % of the width is the length? (4) Sold 47% of the contents of the store for $9447.00. What will the remainder bring if sold at same price? (5) Find 84.5% of $3840.

Wednesday—Oral.—(1) 3/5 + 1/3 = what %? (2) 84 + 7 + 3 + 5½ + 12 + 6½ = 50%. What is 100% equal to? (3) After selling 4/5 of an estate what % remains? (4) A, B and C own a store. A owns 2/5, B, ½ as much as A, and C, the rest. What % does C own? (5) 200% of a number is 60. What is 50% of that number?

Written.—(1) Find the cost of 250 feet of wire netting at 48 cents per 100 feet. (2) Express as decimals and as common fractions in lowest terms 6¼%, 12½%, 15¾%, 32½%, 45/8%, 101%, 25%, 127⅕%. (3) $534 is 25% of what sum? (4) Which is more and how much, 18% of $362.00 or 50% of $126.00? (5) $620.00 is 200% of what sum?

Thursday—Oral.—(1) Wire costs 60 cents per 100 feet. What is the cost of 175 feet of wire? (2) What is the value of 2% of $200 worth of wheat? (3) What is the value of ⅔ of 1% of $100 worth of wheat? (4) ½ of 1% of $200 equals? (5) ½% of $200 equals what % of $100?

Written.—(1) $430 is 16⅔% of what sum? (2) What is 87½% of 1274 pounds? Use common fractions in performing the operation. (3) 37½% of 64 days = ? (4) 12½% of 60 feet equals how many inches? (5) 98% of the pupils in a class are present. Four pupils are absent. How many in the class?

Friday—Oral.—(1) How many yards in ½ mile? (2) How many feet in 33⅓% of a mile? (3) How many feet in 50% of a mile? (4) 86 + 7 + 2 — 3½ + 4 — 7 = 50% of what number? (5) After selling 6⅔% of his stock, a man who owned ⅔ of the capital in a concern had $60,000.00 left. What was the value of the entire capital?

Written.—(1) A colt worth $148 increased 25% in value in eight months. How much was it then worth? (2) John Ellis, a farmer, buys from Henry Grant, his grocer, 14 pounds of coffee at $.28 per pound, 22 pounds of starch at $.04 a pound, 9 boxes of soap at $3.15 a box, 35 pounds sugar at $.06 a pound. He pays by giving 4 barrels of potatoes worth $1.75 a barrel, ½ ton of hay worth $19.00 a ton, 1 cord wood worth $5.50, 30 dozen eggs at 38 cents a dozen. How much does he still owe? (3) Make out Mr. Ellis' bill. (4) Make out Mr. Grant's bill. (5) Find 38% of $1250.75.

Sixth Week.

Monday—Oral.—(1) Merchant sold 23%, 14%, 16½%, 5% of his goods. What % left? (2) After a special sale a dealer finds that 13⅓% of his stock has not been sold. What % was sold? (3) 45% of $2 equals? (4) 32% of $3 equals? (5) After selling 50% of his flour a grocer has 12 barrels left. How many barrels has he sold?

Written.—(1) Three-fourths of the book paper used last year weighed 10,509 tons. What was the total amount of book paper used? (2) Add 385.007, 43.067, 849.0032, 6½, 9432. (3) A man spends 22% of his salary for rent and heat, 9½% for clothing. What % remains for other expenses? (4) Find 83½% of $565.50. (5) Bought oil at 8½ cents a pint. Cost of 425 gallons?

Tuesday—Oral.—(1) 12½% of the members of a club were absent. What part were present? (2) 34% of $5 equals? (3) Which is more and how much, 33⅓% of 12 gallons or 10 quarts? (4) 25% of 484 equals? (5) 8% of $90 = ?

Written.—(1) A boy spent 12% of his money one day, 18% the next day, and 16⅔% the following day. He had $1.60 left. How much money had he at first? (2) Find number of hours in 33⅓% of a week. (3) Find number of inches in 6¼% of 48 yards. (4) From 66⅔% of $546.50 take 40% of this sum. (5) A man has a house and lot valued at $12,275.00. The house is worth 32% of this sum. Find the value of the lot.

Wednesday—Oral.—(1) Grocer bought a carload of flour. Sold 12½%, 27%, 10½ and had 50 barrels left. How many barrels did the carload contain? (2) Write as decimals and as per cents: 5⅖, 47/10, 5¼, 4/5, 9. (3) 35% of $4 equals ? (4) 47% of $4 equals ? (5) 33⅓% of number of feet in a mile equals?

Written.—(1) Mr. Williams earned $24.80. He spent 75% of it. What did he have left? (2) Reduce to inches 33⅓% of one mile. (3) Find the value of 478⅔ × 64.07. (4) Express as decimals ½%, ⅓%, ⅕%, ⅖%. (5) Add 98.067, 234.0101, 48, 56⅔, 649, 82⅕.

Thursday—Oral.— (1) ½% of $1 equals? (2) ½% of $100.00 equals? (3) ½% of $5 equals? (4) ⅓% of $300 equals? (5) ⅔% of $300 equals? (6) 1⅓% of 300 equals ?

Written.—(1) Find ½% of $275.50. (2) Find ⅓% of $375.15. (3) Find ⅔% of $675.48. (4) Find 1⅔% of $675.48. (5) Bought for $848.75. Sold at a profit of 1⅔%. How much was gained? (6) 85% of $622 equals 50% of what sum?

Friday—Oral.—(1) How many pints in three bushels? (2) Bought oil at 8 cents a pint. Cost of 2 gallons? (3) A class has studied the spelling of 300 words. These are 75% of the total number to be studied during the term. What is the total? (4) 2⅕% of $200 equals? (5) 17% of 300 gallons are how many gallons?

Written.—(1) Wire netting comes in rolls 60 yards long. How many rolls do I need for a fence around a square field one length of which is 210 feet? 2) Cost of fencing this field at $.95 per roll? (3) Sold 66⅔% of his sheep and had 84 left. How many were sold? (4) From 5% of $684 take 3⅔% of this sum. ((5) How many gills in 79 gallons?

Seventh Week.

Monday—Oral.—(1) 48 feet ÷ 4 equals how many inches? (2) 48⅔ feet ÷ 4 equals how many feet and inches? (3) How many pints in 7½ gallons? (4) 4 yards 1 foot are how many inches? (5) How many quarts in 87½% of a bushel?

Written.—(1) After selling 66⅔% of his crop what % does a farmer have left? (2) If 250 bushels are left, how many bushels were raised? (3) At $94.75 an acre, what is the cost of 34 acres? (4) If you have 25 words in a spelling test and are marked 96%, how many words did you misspell? (5) Find the value of ⅜ ÷ 5½ × 16.33.

Tuesday—Oral.—(1) Tom has 12 marbles and his brother 48. What % of the number of his brother's marbles are Tom's marbles? (2) What % of the number of Tom's marbles are his brother's marbles? (3) Bought two lots, paying $100 for the first and $124 for the second. How many hundredths more than the first does the second cost? (4) Paid $95. Sold at a gain of 1%. Selling price equals ? (5) Paid $95. Sold at a gain of 2%. Selling price?

Written.—(1) Land sells for $349 a city lot. Cost of 8½ lots? (2) Bought an automobile for $1675. Sold it at a gain of 5%. Selling price? (3) Bought for $1675 and sold at a loss of 16%. Selling price? (4) 25% of 3 miles are how many feet? (5) Bought for $1725.50. Sold at a gain of 8½%. Selling price?

Wednesday.—(1) How many hours in 50% of 1 week? (2) A horse costs $125 and a carriage $150. The carriage costs how many hundredths more than the horse? (3) 25% of 2 gallons are how many gills? (4) 4% of $75 equals? (5) What % of $100 is $56.50?

Written.—(1) Add 298.7, 6⅕, 538.0107, 94.02006, 85½, 3742. (2) What % of $75 are $20? (3) What % of $250 are $75? (4) What % of 65 is 15? (5) What % of $200 are $65.50?

Thursday—Oral.—(1) What % of a gallon is a quart? (2) What % of a week is one day? (3) What % of a day are three hours? (4) What % of a bushel is one quart? (5) What % of ½ is ¼?

Written.—(1) What % of the month of January is one week in that month? (2) What % of 42 gallons are 32 quarts? (3) What % of 45 gallons are 6½ gallons? (4) What % of $325.50 are $42? (5) The days in the month of June are what % of the total number of days in the year?

Friday—Oral.—(1) ⅓ is what part of ⅔? ⅓ is how many hundredths of ⅔? (2) What % of ⅔ is ⅓? (3) What % of 1 is ⅕? (4) ⅓ is what % of 1? Of 2? Of 3? (5) What % of 1 bushel is 1 quart?

Written.—(1) A tank when full holds 42 gallons 1 quart. How much does it hold when 75% full? (2) A plot of land is 32.6 feet long and 50% as wide. It is rectangular in shape. How long is the fence which encloses it? (3) How far will an automobile which moves at the rate of 1 mile in 7½ minutes travel in 2½ hours? (4) What % of 284 is 6½? (5) What % of 327 is 9¼?

Eighth Week.

Monday—Oral.—(1) Add 5.3, 1½, 15.4, 9½. (2) 5/6 × 4 = ? (3) 5/6 × ¼ = ? (4) 5/6 ÷ 4 = ? (5) 8/17 ÷ 1/17 = ? (6) Cost $25. Gained 25%. Selling price? (7) Cost $25. Lost 25%. Selling price?

Written—(1) A farmer owned 1408 sheep and sold 6¼% of them. How many did he sell? How many remained? (2) Perform the following examples without resorting to decimal fractions: 33⅓% of 294, 8⅓% of

4265, 16⅔% of 784. (3) Add the following: 528⅖, 827.9, 26.0008, 927.014, 25,832.6, 26⅕. (4) Money loaned on a mortgage of $6350.00 brings an income of 5½% each year. What does it yield in 4 years? (5) Find the value of $128\ 7/9 - 6/7 \times 3\frac{1}{2} \div 4\frac{1}{3}$.

Tuesday—Oral—(1) Give other names for the following: 9 feet, ¾ pound, 32 ounces, 11 yards. (2) Give other names for the following: 250 minutes, 1 rod, 16 quarts, 12 pecks, ½ quart. (3) What is 66⅔% of 90? Of 360? (4) What is 66⅔% of 180? of 150? of 1 hour? of 2 feet? (5) What is 33⅓% of 10 yards? of 48 ounces? of 2 gallons 1 quart?

Written.—(1) Bought an automobile for $795. Sold it for 17% less than it cost. What was the selling price? (2) Bought 55 acres of land at $87 an acre, and 16 cows at $44 a head. Sold the land at a profit of 6½% and the cattle at a loss of 8%. What is the gain or loss in the entire transaction? (3) Cost $255. Gain 4½%. Find the selling price. (4) Paid $232.75. Sold at a gain of 9%. Selling price? (5) Cost $752.50. Lost 3½%. Find selling price.

Wednesday—Oral.—(1) A storekeeper pays 2 cents each for pencils and sells them at a gain of 50%. What does he gain by selling 3 dozen? (2) What does he receive from a sale of 4 dozen? (3) A grocer buys sugar at 5½ cents per pound and sells it at 6 cents per pound. What does he gain from a sale of 24 pounds? (4) What does he gain from a sale of 96 pounds? (5) ⅔% of $600 equals ?

Written.—(1) Add 386.05, 764.0026, 684.027, 6⅖, .0108, 29.308. (2) Find the value of $\frac{64.32 + 5.06 - 7\frac{1}{5}}{84.1\frac{1}{2} + .7 - 36}$ (3) 1 inch is what part of one yard? (4) 1 inch is how many hundredths of a yard? 1 inch is what % of a yard? (5) 2 inches = what % of 1 yard?

Thursday—Oral.—(1) What part of 42% is 21%? (2) How many hundredths of 42% is 21%? (3) How many hundredths of 1⅕ are ⅗? (4) What % of 1⅕ are ⅗? (5) 25% of the population of a town attended a meeting at which 6,000 people were present. What is the population of the town?

Written.—(1) A wheel is 16 feet 2½ inches in circumference. How many revolutions will it make in going ⅓ of a mile? (2) How many revolutions will it make in going ½ mile? (3) Change 268 pints to higher denominations. (4) 64 rods are what fractional part of a mile? (5) 64 rods are how many hundredths of a mile?

Friday—Oral.—(1) What part of 4 hours is ½ hour? (2) ½ hour is how many hundredths of 4 hours? (3) Which is more and how much, 20% of 1 yard 2 feet or 14 inches? (4) What part of 2½ feet are 5 inches? (5) How many hundredths of 2½ feet are 5 inches?

Written.—(1) 56½ rods are what fractional part of a mile? (2) 56½ rods are how many hundredths of a mile? (3) How long is a fence which encloses a plot 118 feet long and 60¼ feet wide? (4) Date, fill, foot and receipt the following bill for groceries: 8 pounds coffee at 31 cents; 3 pounds tea at 53 cents; 3 pounds ham at 17 cents; 4½

pounds butter at 35 cents; 2½ dozen eggs at 42 cents; 1¾ pounds cheese at 20 cents.

Ninth Week.

Monday—Oral.—(1) One and five-tenths pounds of cheese cost 18 cents. What would 3½ pounds cost? (2) 6½ yards of silk cost $3.90. What does 1 yard cost? (3) 6½ yards of silk cost $3.90. What is the cost of 1½ yards? Of 4 yards? (4) What decimal part of an hour are 45 minutes? (5) What decimal part of the number of months in a year is one month?

Written.—(1) 3 bushels and 3 pecks of potatoes cost $3.20. What is the cost of 6 bushels? (2) A man bought 54 horses for $7,319. He sold them at a loss of $319. How much did he pay for each? (3) How much did he receive for each horse? (4) Five inches are what decimal part of a yard? (5) If 25 words are given in a spelling test and a pupil's mark is 88%, how many words has he mis-spelled?

Tuesday—Oral.—(1) At 5% of a dollar per pint, how much oil can I buy for $1.85? (2) 36⅔ feet ÷ 4 are how many feet and inches? (3) How many inches are there in 2½ yards? (4) How many gills in 1¾ gallons? (5) Sold 3 quarts of potatoes. What % of a bushel were sold?

Written.—(1) What will 6 pounds 4 ounces of butter cost if 1½ pounds cost 38 cents? (2) Find the cost of 65% of a hundred-weight of sugar at 6¼ cents a pound. (3) A man earns $28 a week. He saves 10% of his salary. How much does he save in 2½ years? (4) Find the value of 8.38 ÷ 17⅔ × 3½ + .09. (5) Add 65.0107, 181.0801, 6.9, 87 4/25, 964.

Wednesday—Oral.—(1) A barrel of pork sold for $24, which was 150% of its cost. Cost? (2) From 8% of $2 take 2% of $5. What is the remainder? (1) How many feet in 66⅔% of 1½ yards? (4) How many hours in 66⅔% of a working week (6 days, 8 hours each.)? (5) How many dimes are there in $24.30?

Written.—(1) What is the cost of 6 barrels of sugar, weighing 324 pounds each, at 5½ cents a pound? (2) A man borrows $1,835 for a year and pays 5½% of that sum for the use of the money. What amount did he have to pay at the end of the year? (3) What part of 8 yards is 75% of 1 foot? How many hundredths? (4) Divide .62 of 8,372 by 12.7. (5) The cost of paving a road at $.29½ per square foot is $12,840.00. How many square feet of road were paved?

Thursday—Oral.—(1) .98 ÷ .02 = ? (2) In the example 28 ÷ 4, multiply the dividend by 10 and the divisor by 10. What can you say of the quotients? (3) Multiply the dividend and divisor by any other number and perform the division. What can you say of the quotients? (4) 9.6 ÷ .12 = ? (5) 42½ × .3 = ? (6) 5⅖ × .06 = ?

Written.—(1) From a barrel of vinegar containing 42.5 gallons, 28 gallons 3 quarts were taken. How much remained? (2) What decimal part of $350 is $25? (3) At $1⅜ per bushel, how many bushels of wheat can be bought for $543.87? (4) What part of 27.05 is 4½? What decimal part? (5) What decimal part of the hours in one week are 12 hours?

Friday—Oral.—(1) At $3 a barrel what will 4¼ barrels of potatoes

cost? (2) Cloth costs $1.25 per yard. What is the cost of 2.5 yards? (3) By selling apples at 10 cents a quart a grocer gains 64 cents on the bushel. What did they cost him per quart? (4) A man buys oil at 64 cents a gallon and sells it at 14 cents a pint. What part of the cost is the gain? (5) What decimal part of the cost is the gain (in example 4)?

Written.—(1) At $5⅖ a barrel, how many barrels of flour can one buy for $28.60? (2) If 25 barrels of flour, each containing 199 pounds, cost $124.50, what must a grocer charge in order to gain 1 cent on each pound? (3) ⅝ of 6/11 of 88 ÷ .3 of 4/9 of 27 = ? (4) How many pints in 236 gallons 1 pint? (5) Two men work at the same task. It would take one working alone 6 days to complete it. It would take the other working alone 4 days to complete it. What part of the work is accomplished at the end of 2 days?

Tenth Week.

Monday—Oral.—(1) A boy had $1.75 and spent ⅖ of it. How much is left? (2) What part of a dollar did the boy in example 1 spend? (3) How many hundredths of a dollar did he spend? (4) How many hundredths of ten dollars did he spend? (5) How many quarters in $14.75?

Written.—(1) A grocer bought 16 pounds 8 ounces of butter paying 37 cents a pound. He sold it all for $7.48. What was his profit or loss? (2) 7 dozen hooks sell for 49 cents. What is the cost of 9½ gross? (3) A farmer has two fields, one of 84 acres, the other 125% as large. What is the combined area of the two? (4) Divide 94% of $384.25 by 12⅗. (5) A grocer sold 27 pounds 3 ounces of pepper, which was 7/100 of his entire stock. What amount was left?

Tuesday.—(1) $27.60 will buy 9 barrels of flour. What is the cost of 6 barrels? (2) How many times are 3 contained in .12? (3) How many times are .3 contained in 12? (4) How many times are .03 contained in 12? (5) From .4 of 12 take .04 of 12.

Written.—(1) 1 barrel of flour contains 4 bushels of wheat. How many barrels and what fraction of a barrel can one fill with 45.25 bushels? (2) A man owns 9/16 of the capital in a corporation. He sells ⅖ of his share and gives 40% of the remainder to his son. What share of the capital does he retain for himself? (3) Find 75% of 4 gallons, 1 quart, 1 pint. (4) Find the length of 72% of a road whose entire length is 2.25 miles. (5) In the last example, what is the number of feet and inches in 72% of the road's length?

Wednesday—Oral—Review liquid measure and dry measure. Rapid drill in addition of mixed numbers.

Written—(1) Cloth is $1.90 a yard. How many yards and inches can one buy with $11.50? (2) What part of 7/9 is ⅞? (3) How many hundredths of 7/9 are ⅞? (4) How many hundredths of ⅞ are 7/9? (5) What part of 1,000 is 280? How many hundredths?

Thursday—Oral—Review time table, tables of common measurements, terms "gross" and "dozen."

Written—(1) A man paid $4,834 for a farm of 54 acres. He sold the land at a total gain of $216.00. What did he receive per acre? (2) ⅚ is

what part of 10? (3) 5% are how many hundredths of 10? (4) 5% are how many hundredths of 100? (5) Write as a decimal 3/5 of 1% of 100.

Friday—Oral—(1) A farmer sold 8 barrels of apples, each containing 2.50 bushels. What did he receive for them if he charged $.50 for a bushel? (2) Find the difference between ½ ÷ ½ and ½ × ½. (3) Which is more and how much: .50 × .50 or .50 ÷ .50? (4) Add 8.4, 3/5, 19½, 6.02, 7½, .04. (5) From ⅓ × .50 take 50% of ⅓.

Written—(1) How many bushels, quarts, etc., of potatoes at $.84½ a bushel can a buyer get for $25? (2) Two men earn respectively $30 per week and $24.50 per week. What part of the combined earnings does each man earn? (3) What decimal part of the combined earnings does each man earn? (4) The first man's salary is what decimal part of that of the other? (5) Bought 16 bushels 3 pecks of nuts at $8.35 a bushel. Sold them at $.12 a quart. Gain or loss?

Arithmetic Daily Plan—6B

THIRD WEEK.

Monday—Oral—(1) Review definitions of "base," "rate," "percentage." (2) How many yards in 50% of 1 mile? (3) How many feet in 33⅓% of one mile? (4) ¾ of a number is 99; what is the number? (5) 75% of a man's money is $15; what is 25% of his money?

Written—(1) A number plus ½ of that number is 975; what is the number? (2) 75% of a man's income is $3,420; what is 7% of his income?

Tuesday—Oral—(1) What is 1% of $22.00? (2) What is 99% of $22.00? (3) 2% of $45 = ? (4) 50% of 45 = ? (5) What is 48% of $45? (6) What is 52% of $45? (7) Find 98% of $45.

Written—(1) Reduce 82% of the number of ounces in 47 pounds to higher denominations. (2) Reduce 52% of the number of feet in 3½ miles to higher denominations. (3) If 1 pound of corn yields 4 ounces of starch, how much starch can be obtained from 27 bushels of corn, each bushel weighing 65½ pounds? (4) Find the value of 37% of 4/9 of 867. (5) From 37% of $62.50 take 82% of $19.25.

Wednesday—Oral—(1) 1/7 = how many hundredths? (2) 6/7 = how many hundredths? 6/7 = what %? (3) 14 2/7% of $40 = ? (4) 85 5/7% of $49 = ? (5) From 75% of $444 take 25% of this sum. (6) How many hours in 85 5/7% of a week?

Written—(1) From 245.03 take 91⅞. (2) A train travels 52.5 miles an hour; how many miles will she travel in 5 hours 45 minutes? (3) Sold $752.50 worth of goods through an agent who charges 2½% commission; what are the net proceeds? (4) An agent collects $1,550.75; he charges 5% commission; what does he receive? (5) After paying 1¾% for selling $2,800.00 worth of goods, how much remains?

Thursday—Oral—(1) What % of 3 gallons is 3 quarts? (2) After spending ½ and then 20% of my earnings I have $9 left; what are my earnings? (3) From 60% of $55 take 40% of this sum (one operation). (4) From 65% of $20.00 take 60% of this sum; what is the remainder? (5) ½ × 33⅓% of 18.6 = ?

Written—(1) From 87% of $83.75 take 12% of 4 × $83.75. (2) Which is more, 12% of 4 × $83.75 or 48% of $83.75? (3) Add 657.8304,

59.0067, 8.0109, 17.065, 2,1002. (4) 87½% of ⅗ × 2/9 × 466 = ? (5) From 19% of $86.50 take 17½% of this amount.

Friday—Oral—(1) 97% of $15 = ? (2) 103% of $15 = ? (3) 53% of $15 = ? (4) 47% of $15 = ? (5) 5% of $15 = ? (6) 95% of $15 = ? (7) 25% of $16 = ? (8) 25% of $15 = ? (9) 75% of $15 = ?

Written—(1) 87½% of a number is 294; what is the number? (2) 87½% of a number is 686; find 85% of the number. (3) The width of a lot is 10% less than the length; the width is 96.8 feet. What is the length? (4) What number minus 25% of itself equals 29,226? (5) What number minus 20% of itself equals 8,424?

FOURTH WEEK.

Monday—Oral—(1) A bicycle goes 8 feet 6 inches at each revolution of the wheels; how many revolutions will it make in going 34 feet? (2) 2% of $5 = ? (3) 98% of $5 = ? (4) 52% of $5 = ? (5) 33⅓% of $39 = ? (6) 10% of $39 = ? (7) 90% of $39 = ?

Written—(1) A number plus 33⅓% of itself equals 9,008; what % of the number is 9,008? (2) What is 33⅓% of the number? (3) A number minus 33⅓% of itself is equal to 9,008; find the number. (4) In example (3) 9,008 is what % of the number? (5) What is 75% of a number, 66⅔ of which is 8,462?

Tuesday—Oral—(1) Teach cubic inch, cubic foot, cubic yard. (2) How many cubic inches are there in a rectangular solid 2 inches long, 1 inch thick and 1 inch wide? (3) How many cubic inches in a rectangular solid 2 × 2 × 2? (4) How many cubic inches are there in a cube one of whose edges is 1 foot long?

Written—(1) Teach second case in percentage (finding rate when percentage and base are given). (2) What % of $425 are $25? (3) What % of $95 are $5? (4) What % of 1 day is half an hour? (5) What % of 15 is it?

Wednesday—Oral—(1) Had 40 cents; spent 10 cents; what decimal part of my money did I spend? (2) What % of my money did I spend? (3) What decimal part of 48 is 24? (4) What % of 48 is 24? (5) What % of 100 is 94⅔? (6) What % of 100 is 84½?

Written—(1) There are 495 pupils at an assembly; 295 are boys, the remainder girls; what % are girls? (2) A man's salary is $4,000 per year; he spends 20% for clothing, 12% for rent, 4% for books, and $1.028 for other purposes; how much has he left? (3) What % of his salary does he have left? (4) What % of his salary does he spend? (5) What % of $25 are $12?

Thursday—Oral—(1) Spent 30 cents; had $1.70 left; what % did I spend? (2) What % did I have left? (3) .0328 × 100 = ? (4) 32.8 × 100 = ? (5) 3.28 × 100 = ? (6) .0328 × 100 = ? (7) 328 × 100 = ? (8) 328 ÷ 100 = ?

Written—(1) A man's salary is $22 a week; he spends $21 a month for rent, $7 a week for groceries, $200.00 a year for clothing and 12% of his income for other expenses; how much does he save in a year? (2) What % of his income does he save in a year? (3) What % of his income does he

spend in a year? (4) 1½ feet are what % of 5 yards? (5) 6 ounces avoirdupois are what % of 12 pounds?

Friday—Oral—(1) What % of 2 yards are 12 inches? (2) What % of 2 yards are 6 inches? (3) What % of 6 inches are 2 yards? (4) What % of 1 mile are 4 miles? (5) What % of a pound avoirdupois are 6 ounces?

Written—(1) A vessel passed through the Suez Canal in 16 hours, 45 minutes; the canal is 90 miles long; what was the rate of passage per hour to the nearest tenth of a mile? (2) It takes a steamer 7 days to cross the ocean. What % of the distance does the steamer average in a day? (3) What % of the journey has it made after 3 days if it moves at a uniform speed? (4) What % of 3 rods are 5 yards? (5) 12 ounces avoirdupois are what % of 14 pounds?

Fifth Week.

Monday—Oral—(1) How many cubic inches are there in a cube, each of whose sides is 6 inches long? (2) What % of 18 is 6? (3) What % of $2½ is $.50? (4) What % of $5.00 is $1.25? (5) What % of 1 is ⅔?

Written—(1) What % of 6 bushels are 2 quarts? (2) What % of a day is 75% of 1 hour? (3) Make out in proper form, find the footing and receipt the following bill: Mr. T. G. Gordon bought of Henry Ehrlich 28 yards of silk at $2.40, 12 yards of French broadcloth at $4.75, 16 yards of Irish linen at $.68¾, and 3 tablecloths at $5.15 each. (4) What % of $25 are $5.50? (5) What % of a ton are 67 pounds?

Tuesday—Oral—(1) From 25% of $8 take 20% of $6. (2) From 25 % of $10.00 take 50% of $4.00. (3) From 100% of a number take ⅜ of the number; what % remains? (4) A man has 45 pounds of lead and sold 9 pounds; what % did he have left? (5) What % of 60 is 12?

Written—(1) Two men own a farm of 720 acres; one man owns 37½% of the entire land; how many acres does the other possess? (2) Out of 350 words a boy missed 14; what % did he misspell? (3) What % of 4 miles are 800 rods? (4) Mr. Clarke's salary is $1,800.00 per year; how much does he earn in 4 years, 2½ months? (5) What % of 1 ton are 75 pounds?

Wednesday—Oral—(1) ½ bushel is what % of 3 bushels? (2) 6 ounces are what % of 6 pounds? (3) 6 ounces are what % of 2 pounds? (4) 3 quarts are what % of 3 gallons? (5) 2 gills are what % of 2 quarts? (6) What % of one quarter is one dime?

Written—(1) How many pounds in 25% of 2 tons? (2) What % of 65 pounds are 47 ounces? (3) What % of 8 gallons are 9 pints? (4) What % of 3 cubic yards are 2 cubic feet? (5) What % of 16 square feet are 4 square inches?

Thursday—Oral—(1) A man walks 24½ miles in 8½ hours; how many miles does he walk if he keeps on at this rate for 50% of this time, i. e., of 8½ hours? (2) What % of 25 is 8? (3) What % of 16 is 6? (4) What % of 5 dozen is ¼ dozen? (5) Find 99% of $75. (100% — 1%.)

Written—(1) From a barrel containing 32 gallons, 28 gallons 3 quarts were taken; what % remained? (2) Had $24.75; spent $4.60; what % remains? (3) What is the cost of 26 pounds 4 ounces of butter if 2½ pounds cost 80 cents? (4) What % of 9½ is ¼? (5) What % of 28⅔ is ⅓?

Friday—Oral—(1) 48⅔ feet ÷ 4 equals how many feet and inches? (2) A horse costs $125, harness 2.5% as much; what is the cost of the harness? (3) What is the cost of 2 bushels 2 pecks of apples at 5 cents a quart? (4) What is the value of 4 gallons 2 quarts of alcohol at 10 cents a pint? (5) What % of 1 is ⅓?

Written—(1) After paying 1¾% commission to his agent on a collection of $1,850, what does a man have left? (2) Of two partners, one contributes $450, the other $950. What % of the total capital has each contributed? (3) What % of 64 square yards are 27 square feet? (4) What % of $125.50 are $5.50? (5) Bought 12½ yards of goods at 69 cents a yard; what % of ten dollars did I have to give in payment?

Sixth Week.

Monday—Oral—(1) ½ foot is what % of a yard? (2) The base is 800 and the percentage is 400; what is the rate? (3) The base is 700; the percentage is 70; what is the rate? (4) What % of 5.6 is 1.6? (5) What % of 4½ is ½?

Written—(1) Add 34.097, 25.0606, 14 2/9, 1,346.05, 27.09, 13⅘. (2) Divide 5/6 of $482.50 by 7⅜. (3) A man bought a farm for $5,950 and sold it at a gain of $520; what % of the cost was the gain? (4) A man bought 48 bushels of corn at $1.95 a bushel; he sold at a gain of 12½%; what did he receive in payment for the corn? (5) What % of 100 is ⅓?

Tuesday—Oral—(1) What % of 5 is ½? (2) What % of 30 is 18? (3) What % of ½ is ¼? (4) What % of ½ is ⅛? (5) What % of 1 is ⅛?

Written—(1) Had $28; spent $12.75; % left? (2) Bought house for $4,700.00; sold it at a gain of $525.00. What % of the cost was the gain? What % of the cost was the selling price? (3) Cost $850.75; loss $35; what % of the cost was the loss? What per cent of the cost was the selling price? (4) 2 feet 7 inches are what % of 14½ yards? (5) Grocer had 7½ barrels of vinegar each containing 29 gallons 1 quart; he sold 64 gallons; what % of his vinegar did he sell?

Wednesdey—Oral—(1) What % of 20 is 19? (2) What % of $1.75 is 25% of $1? (3) 40 minutes are what % of an hour? (4) Sold ½ of ¼ of my goods; what % remained? (5) From 75% of a gallon take 5 pints; what is the remainder?

Written—(1) Paid $95.75 for a table; sold it for $100; what % of the cost is the profit? (2) What % of 76¼ is 9.55? (3) Out of a total number of 2,400 pupils, 96 are absent; what % are present? (4) A fruit merchant bought 33⅓% of 477 crates of fruit; 9 crates were damaged in the shipment and of the rest he sold 16⅔%; how many crates did he have left? (5) What % of 85⅓ is 27.16⅔?

Thursday—Oral—(1) What % of a day are 4 hours? (2) Which is more and how much, 4½ gallons or 50% of 33 quarts? (3) What % of 2/7 is 1/7? (4) What % of 3/19 is 1/19? (5) What % of 1/19 is 3/19?

Written—(1) A grocer bought 75 quarts of walnuts at $.42 and 65 quarts of chestnuts at 25% more per quart than the price of the walnuts; for which did he pay the bigger price and how much? (2) Write out the following in regular form of a check: New York, N. Y., March 1, 1913.

No. 15. First National Bank, Pay to the order of Carlton Brownson $450.00. Sign your own name. (3) What % of 75 is ½? (4) What % of 75 is 8½? (5) What % of $75 is $5.75?

Friday—Oral—(1) What % of 45 is 9? (2) What % of 9 is 45? (3) Add 6.5, 4.03, 9½, .11, 6¼, 12. (4) From 33⅓% of $1.50 take 75% of $1; remainder? (5) What % of 3½ dozen pens are 7 pens? (6) What % of 50 cents is $2½?

Written—(1) Bought a farm of 84 acres at $160.00 per acre; erected buildings on the farm costing 35% as much as land; then sold the whole for $20,000; gain or loss, and how much? (2) In the last example what % of the cost was the gain or loss? (3) What % of the cost was the selling price? (4) What % of 8 bushels are 3 bushels 2 pecks 2 quarts? (5) What % of $78¾ is $1.50?

Seventh Week.

Monday—Oral—(1) 12½% of $84.24 = ? (2) 50% of $84.24 = ? (3) 33⅓% of $84.24 = ? (4) Add 7½, 3⅖, 4.1, 5.2, 16. (5) What % of 2 yards are 4 feet 6 inches?

Written—(1) What % of 18 yards are 4 yards 3 inches? (2) What % of 2 rods are 3 yards? (3) 32 cents are what % of $12? (4) What % of 6 gallons are 2 gallons 2 quarts 1 pint? (5) 7 days are what % of a leap year?

Tuesday—Oral—(1) 2% of $14 = ? (2) 50% of $14 = ? (3) 48% of $14 = ? (4) 98% of $14 = ? (5) 25% of $14 = ? (6) 75% of $14 = ?

Written—(1) Had $128 worth of goods and sold $28 worth; what % did I have left? (2) A train sets out on a 380 mile trip and reaches a station 264 miles from the starting point; what % of the total distance remains to be covered? (3) What % of 1,000 cubic yards are 1,800 cubic feet? (4) The distance between New York and Havre is 3,200 miles; what % of this distance has a steamer crossed which is 425 miles from New York?

Wednesday—Oral—(1) What % of 100 is 50% of a dozen? (2) What % of a gross is 12% of 100? (3) What % of 25 is 5% of 50? (4) What % of a yard is 50% of a foot? (5) What % of $60 is 12% of $100? (6) Which is more and how much, 24% of $50 or 12% of $100?

Written—(1) What % of a mile is 35 rods? (2) A plot of 84 acres in size covers what % of the area of a square mile? (3) What % of the area of 2 square miles? (4) Which is more and how much, 48% of $24.84 or 12% of $6.21? (5) From 95% of the contents of a barrel containing 31 gallons of wine, 45% of the contents were drawn; how much wine remained in the barrel (one operation)?

Thursday—Oral—(1) What % of 3 dozen are 6? (2) What % of 3 dozen are 6 dozen? (3) A boy deposited $2 in the bank; at the end of a year the interest on his money amounted to 12 cents; what % interest did he draw? (4) 25% of 2 gallons are how many quarts? (5) 8⅓% of 2 gross are how many dozens?

Written—(1) 86.4308 × 1.0909 = ? (2) Add 38.096, 42.6046, 78.0919, 2783.1, 45.0946, 384.05. (3) A man whose income is $2,450 a year spends $275 for clothing; what % of his income goes to this item? (4) What %

of 5 gross are 484? (5) Bought a house for $14,350, sold it at a gain of $500; % gained?

Friday—Oral—(1) What % of a square foot are 24 square inches? (2) 75% of $24 = ? (3) 2% of $24 = ? (4) 77% of $24 = ? (5) 73% of $24 = ? (6) How many gills in 75% of 1 gallon?

Written—(1) How many bottles each containing 2 gills can be filled from a vessel containing 28 gallons 3 quarts? (2) One gallon of maple syrup can be made from 11 gallons 1 quart 1 pint of sap; how many pints of sap will make 6 gallons of syrup? (3) A man bought a horse for $180 and sold it to his neighbor at a profit of 25%; his neighbor sold it at a loss of $22; what was the final selling price? (4) What % of 15 is ½? (5) What % of $25 is 75 cents?

Eighth Week.

Monday—Oral—(1) How many tons in 3,500 pounds? (2) What % of 40 is 35? (3) What % of a ton are 3,500 pounds? (4) What is the value of 6 pounds 4 ounces of butter at 32 cents a pound? (5) How many inches in 75% of 2 yards?

Written—(1) A fence 185 feet long is prolonged 35 feet. What % of the original length is the prolongation? (2) What % of 84 gallons are 27 gallons 2 quarts 1 pint? (3) A team loses 32 games and wins 56; what % of the total number of games played are won? (4) Bought for $8,640; sold at a gain of $520; % gained? (5) What % of 385 is 46½?

Tuesday—Oral—(1) In the late war Turkey lost 6,300 men, Italy 66⅔ as many; how many men did Italy lose? (2) 64 cents is 12½% of what sum? (3) What % of ⅕ is 1/10? (4) What % of 1/10 is ⅕? (5) What % of ⅔ is ⅓?

Written—(1) What % of 95.75 is 25.05? (2) Out of a capital of $7,800, a man spends 25% and then 25% of the remainder; what % of the total capital is thus spent? (3) Bought for $1,450, sold for $1,755; % gained? (4) Bought for $1,755, sold for $1,450; what is the % lost? (5) Prove examples (3) and)4).

Wednesday—Oral—(1) What % of 25% is 5%? (2) What % of 12% is 1%? (3) What % of 75% of a number is 25% of that number? (4) What % of 1½ times a number is 50% of that number? (5) What % of 3 times a sum is 50% of that sum?

Written—(1) Teach receipt form. Review check form. (2) James Keenan buys from S. S. Pierce of Boston, Mass., for cash: 24 gallons molasses at 48 cents; 32 gallons syrup at 49 cents; 25 pounds raw mixed coffee at 29 cents; make up the bill. (3) A ship on a 3,375 miles journey has traveled 2,000 miles; what % has she still to cover? (4) What % of 27 is ⅔? (5) What % of $85.75 is $5.25?

Thursday—Oral—(1) What % of 3 is ¼? (2) From 5% of a number take 3½% of the number; what % remains? (3) A boy has 55% of $1; he spends 27 cents; what has he left? (4) Out of $25 a man spends $24; what % has he left? (5) What % of 80% of a number is 20% of that number?

Written—(1) What % of 2 miles are 465 rods? (2) What % of a square mile are 440 acres? (3) Bought for $8,250; sold for $10,000; %

gained? (4) There are 1,840 boys in a school and 640 girls; what % of the total number of pupils are girls? (5) Cost = $82.50; selling price = $75; % lost?

Friday—Oral—(1) Review long measure, liquid measure, dry measure, square measure, cubic measure.

Written—(1) Cost = $25.50; selling price = $30.00; % gained? (2) A man invests $84,350 in a corporation whose entire capital is $100,000; what % of the entire capital does he invest? (3) What % of 3/5 is .046? (4) 2.55 is what % of 22½? (5) Cost $85.75; selling price $90; % gained?

Ninth Week.

Monday—Oral—(1) What % of .1 is .10? (2) What % of 5/9 is 1/9? (3) What % of 25% is 5%? (4) What % of 100 is 89? (5) What % of 100 is 78½?

Written—(1) What % of 6 bushels 2 pecks 2 quarts is 1 bushel 3 quarts 1 pint? (2) What % of 46½ gallons is 1 gallon 3 quarts 1 gill? (3) What % of an acre is 94 square yards? (4) What % of 1 cubic yard is 1½ cubic feet? (5) What % of 3½ hours are 57 minutes?

Tuesday—Oral—(1) A man owes $2,485 and pays 50% of it; what % remains unpaid? How many dollars does he pay? (2) What % of 16 is 1.6? (3) What % of 29 is 2.9? (4) What % of 2.9 is 29? (5) What % of 50 is 55?

Written—(1) A man owns 250 acres of land; he sells part of this property for $11,900, receiving $85 for each acre; what % of his land did he sell? (2) From 29% of $82,360.50 take 97% of $1,459; remainder? (3) ½ × 9/17 ÷ 6.4382 × 8 5/14 + 17.3 = ? (4) 5/6 of ⅔ of ½ = what %? (5) What % of 12 bushels 1 peck 1 pint are 4½ bushels?

Wednesday—Oral—(1) 33⅓% of $180.24 = ? (2) 20% of $550 = ? (3) 45% of $5.00 = ? (4) 95% of $5 = ? (5) 75% of $16.24 = ?

Written—(1) A rectangular plot is 87 feet long, 68½ feet wide; what % of the length is the width? (2) What % of 72 dozen pencils are 51 pencils? (3) Strawberries cost $3.40 a bushel and were sold at 9½ cents a quart; % gained or lost? (4) 25% of $825 is what % of 30% of $840? (5) 76% of a number is what % of 95 % of the same number?

Thursday—Oral—Review standard measures and tables.

Written—(1) Find the difference between .94 of $365 and 7/18 of the same sum. (2) Introduce a bill form from a local merchant and give appropriate example. (3) What % of 68.5 is 125? (4) Bought a farm of 400 acres for $32,500; sold it, receiving on an average $1.25 per square foot; gain or loss, %? (5) A man devotes 36% of his time to work; how many hours does he work per day (6 days in the working week)?

Friday—Oral—(1) 50 × .11 = ? (2) 40 × 2.5 = ? (3) 4/9 ÷ ⅓ = ? (4) 25% of ⅔ of 24 = ? (5) 16⅔% of 50% of 12 = ? (6) Bought for $25; sold for $26; % gained?

Written—(1) A man sold a house that cost him $12,840 so that he gained 34%; what price did he receive? (2) A company mined during one year 76,050 tons of coal and during the following year 37½% more; how much coal (in tons and pounds) was mined during the second year? (3)

Teach third case: 987 is 12½% of what number? (4) $126.50 is ¼ of what sum? 25% of what sum? (5) 168 is 1/10 of what sum? 10% of what sum? 1% of what sum? 2% of what sum?

Tenth Week.

Monday—Oral—(1) How long is a line if 66⅔% of its length is 1 foot? (2) The area of 18% of my land is 360 square feet; what is the entire area? (3) A man sold goods at a loss of $1.50 per yard, thereby losing 33⅓%; what was the cost? (4) In the last example what was the selling price? (5) 8⅓% of a number is 5; what is the number?

Written—(1) Sold property at a loss of 15%, losing $750.85; what was the cost? (2) 942 square feet are 92% of how many square feet? (3) Paid $4,325, sold at a loss of $325; % lost? (4) By selling at a loss of $64.50 a man loses 42%; what did he pay? What price did he receive?

Tuesday—Oral—(1) 7% of a number is 28; what is the number? (2) 8% of my money is $24.80; how much money have I? (3) 6% of the distance from here to the post office is 90 feet; how far is it from here to the post office? (4) 15% of 200 is what % of 100? (5) What % of 33⅓% of a number is 16⅔% of a number?

Written—(1) Cost $95.75; selling price $100; what % gained? (2) Gained 9%, which was $77.76; find cost; find selling price. (3) Cost $158.50; lost 14½%; selling price? (4) From 75% of $324.84 take 16⅔% of this sum. (5) What % of a square mile are 328 acres?

Wednesday—Oral—(1) 12½% of a boy's money is 22 cents; how much money has he? (2) From 25% of $800 take 20% of this sum (one operation). (3) 33⅓% of an audience were women; there were 52 women; how many in the audience? (4) What % of 24% of a quantity is 12% of that quantity? (5) 50% of 30 is what % of 45?

Written—Teach meaning of term interest. Compute interest for years and months.

Thursday—Oral—(1) What is the interest on $200 for one year if the rate of interest is $6%? (2) At the same rate, what is the interest on this amount for 3 months? (3) For 2 years and 3 months? (4) For 5 years and 6 months? (5) For 1 month? (6) For 1 year 7 months?

Written—(1) Interest on $484 for 2 years at 3½%? (2) Interest on $985 for 6 months at 3½%? (3) Interest on $740 for 2 years 3 months at 5%? (4) Interest on $72.50 for 2½ years at 4% = ? (5) Interest on $340 for 5 months at 5½% = ?

Friday—Oral—(1) 3½% of $40 = ? (2) 4½% of $40 = ? (3) 5½% of $6 = ? (4) 8% of $31 = ? (5) 7½% of $20 = ? (6) 33⅓% of $24.30 = ? (7) 95% of $3 = ? (8) Interest on $250 for 3 years at 2% = ?

Written—(1) Interest on $34.50 for 7 months at 6% = ? (2) Interest on $840 for 3 years 2 months at 5% = ? (3) Interest on $350.75 for 6 years 2 months at 3% = ? (4) By selling at a loss of $42.50 a man loses 12%; what was the cost? What was the selling price? (5) Cost = $95.50; selling price = $84.00; % lost?

Arithmetic—7A

FIFTH WEEK.

Oral.—Rapid addition of figures (combining 10's and 11's).

9	7	6	8
4	8	5	2
7	2	8	6
5	6	3	5
5	4	9	2
7	8	9	9

Multiplication by aliquot parts of 100 (all of the business fractions).

79×25 $84 \times 16\frac{2}{3}$ $39 \times 12\frac{1}{2}$

Cost of $33\frac{1}{3}$ yards @ \$.75 per yard?

How many examples were worked by 75 pupils doing on the average of 36 examples each?

Four processes with mixed numbers:

Addition: $4/9 + \frac{2}{3}$; $3\frac{1}{2} + \frac{5}{6}$; $7\frac{1}{2} + 2\frac{3}{4}$.

Subtraction: $\frac{4}{5} - 3/10$; $8 - 3/7$; $6 - 2\frac{3}{5}$; $12\frac{1}{2} - 4\frac{1}{3}$; $10\frac{1}{4} - 5\frac{3}{4}$.

Multiplication: $3\frac{2}{3} \times 6$; $7 \times 7\frac{1}{4}$; $\frac{5}{8}$ of 13; $1\frac{1}{2} \times 11$.

Division: $14/15 \div 7$; $15\frac{1}{3} \div 5$; $18\frac{1}{2} \div 6$; $1\frac{1}{2} \div 1\frac{1}{2}$; $9 \div 1\frac{1}{2}$.

Oral and Written.—Percentage, fourth case.—Finding a quantity when the quantity plus some per cent. of it is given.

After a man received an increase of 10% of his wages he got \$121 per month.

$$B + \left(B \times \frac{R}{100} \right) = \text{amount.}$$

$$B + B = 121$$

$$\frac{11\,B}{10} = 121$$

$$10\,B = 121 \times \frac{10}{11} = 110$$

$$B = 110$$

An orange tree yields 50% more oranges the second year than the first. If the second crop amounted to 420 oranges, how many were there in the first crop?

What number increased by 15% of itself = 138?

Profit.—A house that cost \$3,200 was sold at a gain of 25%. What was the gain? The selling price?

A merchant selling goods at a profit of 10% makes \$75. Find the cost and the selling price of the goods.

A merchant sells his goods at 20% profit, but loses 5% of his sales for bad debts. What is his net rate of profit?

Orders.

257 Broadway, Brooklyn, N. Y.,
December 12, 1912.

Messrs. R. H. Macy & Co.,
Broadway and Sixth Avenue,
New York City.

Gentlemen:

Please send to my address goods selected from your catalogue as follows:

5 lbs. mixed tea	@	$.70
20 lbs. granulated sugar	@	.05½
7 lbs. rice	@	.10
1 case canned tomatoes		2.75
1 box Star laundry soap		1.45

Inclosed you will find a money order for the amount of the above bill, $9.50.

Yours truly,

JAMES LEVINE.

SIXTH WEEK.

Oral.—Short methods of multiplying by aliquot parts of 100. Take the more difficult business fractions as well as multiplication by 125, 375, 625, 875.

Cost of 375 yards at 64 cents per yard; at $.83⅓ per yard of oilcloth, cost of 540 yards.

Special Drill in Approximation.

Find interest on $250 at 6% from January 1, 1908 to December 30, 1911 (nearly 3 years).

What % of 498 is 248 (% of 500 is 250?)

Cost of 989 feet boards @ $30.10 per M.

Division by 50, 25, 33⅓, 16⅔.—At 16⅔ cents per collar, how many for 25 cents?

Oral and Written.—Percentage, fifth case—Finding a quantity when the quantity minus some per cent. of it is given.

What number decreased by 37½% of itself equals 600?

$$B - \left(B \times \frac{R}{100}\right) = \text{Difference}$$

$$B - (B \times .37\tfrac{1}{2}) = 600$$

$$B - \tfrac{3}{8}\,B = \text{Difference}$$

$$\tfrac{5}{8}\,B = 600$$

$$B = 960$$

Profit and Loss.—A farm that cost $3,200 was sold at a loss of 25%. What was the loss? The selling price?

(1) $$\text{Cost} \times \text{Rate \% Loss} = \text{Loss}$$

$$3200 \times \frac{25}{100} = \text{Loss}$$

$$\$800 = \text{Loss}$$

Apply to the five cases.

(2) $C + (C \times R\% = \text{S. P. (in gain)}$

$C - (C \times R\%) = \text{S. P. (in loss)}$

Gained \$54 by selling a house at a gain of 6%

$$C \times \frac{6}{100} = \$50$$

$$C = 50 \div \frac{6}{100} = \$54 \times \frac{100}{6} = 900$$

A house costing \$10,000 was sold at a gain of \$500. What was the gain %?

(3) $$C \times \frac{R}{100} = \text{gain}$$

$$10{,}000 \times \frac{R}{100} = 500$$

$$R = \frac{500}{100} = 5\%$$

(Work problems in loss in same way.)

A horse costing \$85 was sold at a gain of 10%. S. P.?

(4) $$C + (C \times \frac{R}{100}) = \text{S. P.} \qquad ?$$

$$\$85 + 85 \times \frac{R}{100} = \text{S. P.}$$

$$85 + 8.50 = \text{S. P.} = .93.50$$

Received \$270 for a lot, thereby gaining 12½%. Cost?

(5) $$C + C \times \frac{R}{100} = \text{S. P.} \qquad \frac{9}{8} C = 270$$

$$C + C \times \frac{12\frac{1}{2}}{100} = 270 \qquad C = 240$$

Received \$45 for a piano that cost manufacturer \$200. Loss, %?

$$C + C \times \frac{R}{100} = \text{S. P.}$$

(6) $$200 + 200 \times \frac{R}{100} = 450$$

$$2R = \frac{450}{200} = \frac{9}{4}$$

$$R = \frac{9}{4} \div 2 = \frac{9}{8} = 1.12\frac{1}{2} = 112\frac{1}{2}\%$$

Bills.—On ruled paper and personal bills.

Checks.—Use regular printed forms as far as possible.

No. 246 Brooklyn, New York, ..., 191....

First National Bank of New York

Pay to the order of William Jones $800

no

Eight Hundred —— Dollars.

100

Tom Burton.

Receipts and Orders.—See previous weeks.

Seventh Week.

Oral.—Rapid addition of numbers. Insist on grouping tens and encourage groupings of 11's, 12's, 13's, 14's, and even as far as 15's. Add both up and down. Don't allow addition of two numbers below ten, as

9	8	7	6	5
4	3	8	9	7
2	9	7	6	4
3	8	5	4	9
8	7	6	4	7
9	8	7	6	5
7	6	5	4	9
8	2	7	9	8

Continue short methods of multiplying by aliquot parts of 100 and some of the even fractional parts of 1,000.

96×125 $\$240 \times 16\frac{2}{3}$ $630 \times 33\frac{1}{3}$

Dividing by 50, 25, $33\frac{1}{3}$, $16\frac{2}{3}$, 125.

Divide 6,000 by $33\frac{1}{3}$; 725, $16\frac{2}{3}$, etc.

Continue approximations of answers in most work. The work should become almost an unconscious process to pupils.

What % of 44 11/12 is $8\frac{7}{8}$? (Use 45×9.

Multiply 48 8/9 by $49\frac{1}{8}$. (Use 50×50.)

Divide 87 6/7 by 10 5/9. (Use 88 and 11.)

Oral and written.—Continue practice in putting exapmles in equation form.

Review Profit and Loss in its application to the five cases in Percentage.

(1) Finding amount gained or lost when cost and rate of gain or loss is given.

An agent bought 48 barrels of apples at $1.10 per barrel, and sold them at a gain of 30%. Find his total gain.

$$C \times \frac{R}{100} = \text{gain or loss.}$$

$$48 \times 1.10 \times \frac{30}{100} = G. \qquad G = \$15.84$$

(2) Finding cost when amount of gain or loss and the % gained or lost is given.

$C \times \frac{R}{100} = G.$

By selling an article for $6.56 more than he paid for it, a merchant gained 16%. Find the cost.

$$C \times \frac{16}{100} = 6.56$$

$$C = 6.56 \times \frac{100}{16} = 41$$

A horse was sold for $20 less than its cost, which was a loss of 13⅓%.

(3) Finding the gain % when the cost and selling price are given.

The owner of a farm of 160 acres, which cost him $40 per acre, sells ¼ of it at $30 per acre and the remainder at $50 per acre. What % does he gain?

$$C + C \times \frac{R}{100} = \text{S. P.}$$

A farm of 430 acres costing $20,640 was sold for $30,970. Find % gained.

Berries bought at $4.80 a bushel are sold at 18 cents a quart. Find the % of gain or loss.

(4) Finding S. P. when C. and gain % or loss % is given.

Mr. Jones sold a house for $2,800, thereby losing 20%. At what price would he have to sell it to gain 20%?

$$C + C \times \frac{R}{100} = \text{S. P.}$$

A fruit dealer paid $30 for 2 cases of washed figs, each case holding 100 one-pound baskets. At what price per basket did he sell the figs, if he gained 33⅓%?

(5) Finding cost when S. P. and gain % or loss % is given.

A printer sold 3,000 seed catalogues to a firm @ 3¼ cents, thereby gaining 25%. How much did it all cost him?

$$C + C \times \frac{R}{100} = \text{S. P.}$$

A merchant sold cloth at $1.87½ a yard, which was 25% more than it cost him. What did it cost?

(6) Finding gain or loss % when C. and S. P. are given.

What per cent is gained by buying clothing at 10% below market value and selling it at 12½% above?

An ice dealer who bought 300 tons of ice for $750, sold it at the rate of 25 cents per 100 pounds. Find his per cent. of gain.

Commission.—Define terms.

How much would a broker receive, at 2½%, for buying cotton to the value of $16,000?

A broker buys 225 bales of cotton, averaging 480 pounds per bale, at $.1045 per pound. What is his brokerage at 2½%?

An agent's commission at 2¾% was $550 on the sale of 400 acres. At what price did the land sell per acre?

Eighth Week.

Oral.—Short method of multiplying by 9 (10 — 1) and 99.

$$36 \times 9 \quad (36 \times 10 - 36)$$
$$24 \times 99 \quad (24 \times 100 - 24)$$

Cost of 36 bushels at 99 cents per bushel?

Continue rapid addition with grouping of figures.

Review four fundamental processes with fractions, mixed numbers and decimals for speed and accuracy.

How many fourths in 24¾? Reduce 49/63 to lowest terms. Change 100/7 to a mixed number. Add ½, ⅓, ⅚. From ⅓ of a dollar take 10⅔ cents. How many cents in ¼ + ⅕ + 3/10 of a dollar? Change 1/40 to a decimal. What % of a gallon is 1 quart and 1 pint? 200×42.1. $3.6 \div 90$. $6 \div .03$. $5 - .025$. $\frac{2}{3} \div 5/9$.

Oral and Written.—Commercial Discount.—Terms defined: List price, discounts, net price.

Find the net price of an automobile listed at $2,400, if the discounts are 25%, 20% and 10%. Two methods:

(1) Discount on $1. and successive discounts.

(2) Discounts on entire amount.

$$\text{L. P.} - \left(\text{L. P.} \times \frac{\text{R}}{100}\right) = \text{Net Price}$$

$$\text{L. P.} \left(100\% - \frac{\text{R}\%}{100}\right) \times \left(100\% - \frac{\text{R}\%}{100}\right) = \text{N. P.}$$

Find the net cost to a dealer of 280 pounds of Manila rope listed at 12½ cents per pound, discounts 20% and 5%.

What is the difference on a bill of $440 between a direct discount of 35% and successive discounts of 20% and 15%?

What single discount equals to successive discounts of 25, 4, 10?

Problems involving the grade processes and to review work previously taught.

Continued work in bills, checks, receipts, orders. (For forms, see previous weeks.)

Ninth Week.

Four fundamental processes with fractions, mixed numbers, decimals and per cents.

(a)
7,958
4,987
986
13,457
5,498
39
8,679
987
48
8,792

92,765 — 43,876

9,875 × 256

87,649 ÷ 234

Give numerous examples of above types and have time limit for each example.

(b) Change to mixed numbers: 65/7, 57/8, 105/12, etc. Change to improper fractions: 12⅝, 15¾, 8 7/30, etc. ¾+ ½; ⅔+ ½; ¾ + ⅔, 8/9 + ⅗. 9¼ — 2½; 8⅔ — 3½; 3 7/12 — 1¾, etc.

(c) Write as pure decimals: .2½, .3¾, .6⅗, .5 7/20, 1 11/20, etc. Write as pure fractions: .2½, .02½, .03⅓, .08⅓, etc.

Multiplication by 9, 99, 999. Cost of 999 yards at $.27 per yard. 85 × 99; 999 × 48.

Percentage, Taxes.—The total valuation of a town is $800,000. The amount to be raised is $12,000. What is the rate of taxation? What is the tax on $1,000?

How much does a man pay on his house, assessed at $15,000, at the rate of 1.67%?

In 1908 the valuation of real and personal property for New York City was about $7,000,000,000. The amount to be raised was $115,000,000. Find the rate of taxation for that year. Find what a man pays an $25,000 of real estate.

Problems.—Give numerous problems in percentage and in the grade work. Call for approximations.

Give the fractional equivalent of 2½%, 3⅓%, 8⅓%, 6⅔%, 11 1/9%, 9 1/11%, 16⅔%, etc. Write decimally: ½%, ¼%, ⅕%, ⅓%, 1/10%, etc.

If 40% of a boy's money is 60 cents, how much has he?

A basket ball team won 8 games and lost 4. Wha % did they win?

An agent sold 24 reapers in one month and 16⅔% more the next. How many in both months?

In making ice cream, 1 pint of cream is mixed with 2 quarts of milk. What % of the mixture is pure cream?

A ton of iron ore produced 840 pounds of iron. What % of the ore was iron?

A farmer bought 76 sheep at $5.75 apiece and sold them for $414. What % did he gain or lose?

Personal Accounts.

		Cash Account of William Lupin	Dr.		Cr.	
1912						
Nov.	2	To weekly salary	25	—		
	2	By ½ doz. handkerchiefs			1	50
		— Theatre			1	
	4	— Week's board			6	50
	5	— Day's outing			2	50
	9	— Week's carfare			2	65
		— 1 pocket knife			1	35
		— 1 pair shoes			4	50
					20	00
Nov.	9	By balance			5	—
			25	—	25	—

Nov.	9	To cash on hand	5	—			
	9	To weekly salary	25				
	11	By week's board			6	50	

TENTH WEEK.

Continue practice in: (1) Rapid addition of long columns of figures. (2) Short method of multiplying by aliquot parts of 100 and easy fractional parts of 1,000. (3) Four fundamental processes with whole numbers, fractions, mixed numbers, decimals, per cents. (See type examples in previous weeks.)

Short methods of multiplying by $9\frac{1}{2}$, $99\frac{7}{8}$, $99\frac{2}{3}$, 998, $999\frac{4}{5}$, and such simple combinations.

$$\begin{array}{r} 843 \\ \times\ 9\frac{1}{2} \\ \hline 8{,}430 - 421\frac{1}{2} \end{array} \qquad \begin{array}{l} = 843 \times 10 - \frac{1}{2} \text{ of } 843 \\ = 800\ 8\frac{1}{2} \end{array}$$

$$758 \times 99\tfrac{2}{3} = 758 \times 100 - \tfrac{1}{3} \text{ of } 758$$

$$376 \times 998 = 376 \times 1{,}000 - 2\ (376)$$

Get rapid approximations.

Percentage—Continued work in taxes.

A tax of \$22,400 is raised on a certain school district to pay for a new school building. A resident who is assessed \$5,600 pays a tax of \$62.72. What is the total valuation?

The assessed valuation of a city is \$65,489,000; the amount to be raised by tax is \$229,211.50. Find the tax on property assessed at \$12,400.

If the tax rate in Manhattan is \$1.61407, what must a man pay whose property is worth \$27,450?

Interest—Finding the time between dates. Find the interest on \$720 for 2 years, 3 months, 15 days at 5%.

A note of \$450, dated April 28, 1910, was paid May 31, 1912, with interest at 6%. What was the amount paid?

A note of \$120.50 dated February 10, 1912, is due next December 15. What will be the amount due the note bearing interest at 5%?

(1) Solution by equations.

Find the interest on \$800 for 2 years, 6 months at 4%.

$$I = P \times \frac{R}{100} \times T$$

$$= 800 \times \frac{4}{100} \times \frac{5}{2}$$

$$= \$80$$

(2) What principal will yield \$80 interest in 2 years, 6 months at 4%?

$$P \times \frac{4}{100} \times \frac{5}{2} = 80$$

$$P \times \frac{1}{10} = 80$$

$$10$$

Arithmetic—7B

First Week.

First three cases of percentage. Terms—Base, rate, percentage.

Drill—What common fraction in its simplest form is equivalent to 1%, 4%, 5%, 10%, 20%, 25%, 50%, 75%, 100%, 6¼%, 8⅓%, 125%, 1⅔%, etc.

Oral—(1) 37½% of 160. (2) 62½% of 320, etc. (3) In a spelling lesson of 40 words a boy spells 80% correctly, how many did he spell correctly? (4) Of the 20 Hawaiian Islands 60% are uninhabitable. How many uninhabitable islands are there? (5) French capitalists have 300 million francs invested in Mexico, of which 33⅓% is in mines. How much of their capital is in mines? (6) A man lost $72, which was 6% of his money. How much money did he have at first? (7) The daily attendance of our school is 2,850, which is 95% of the school register. What is the school register? (8) A boy spells 45 words right out of 50. To what per cent. is he entitled? (9) Allowing about 60 pounds of water to the cubic foot, what % of the weight of water is the weight of cork, which weighs 15 pounds per cubic foot? (10) Out of 20 games played the Giants won 19, to what per cent. are they entitled?

Written—(1) A cubic foot of water weighs 62.5 pounds. The weight of ice is about 92% of the weight of water. Find the weight of a block of ice containing 4½ cubic feet. (2) A collector deposited $2,400 in coin and 12½% as much in bank bills. What was the amount of his deposit? (3) Three-fourths per cent. of the 6,000 trees in a city were blown down in a violent storm. How many trees were destroyed? (4) What is the difference between ¾ of $576 and ¾% of $576? (5) How much petroleum did California produce one year, if Kern County alone furnished 72% of it, or 18,000,000 barrels? (6) One year 151,590 skilled laborers arrived in the United States. This was 18⅗% of the total number of immigrants. How many immigrants arrived that year? (7) Of the 20,000,000 bushels of wheat exported by the United States one year, 9,000,000 bushels went to Great Britain. What per cent. of the wheat went to Great Britain? (8) If 150 pounds of "lead," used in a medium grade of lead pencils, consisted of 88½ pounds of graphite and the rest clay, find the % of each substance in the mixture. (9) Out of a total of 1,070 boys in Public School 43, 943 entered the field day meet. What % of the boys entered? (10) In the capture of Scutari by the Montenegrins the Turks lost 447 men out of a total of 15,000. What per cent. of the army was lost?

Second Week.

Fourth and fifth cases of percentage.

Drill—A number diminished by 2% is represented by what fraction? A number diminished by 3%, etc. A number increased by 2% is represented by what fraction? Etc.

Oral—(1) A boy receives 87½% by getting 21 words correct in spelling. How many words were given? (2) A school in Brooklyn had an average of 83⅓% by losing 2 games of soccer during the season. How

many games did they play? (3) By jumping 8 feet 3 inches a boy beats his nearest competitor by 10%. What was the record of the next best jumper? (4) A man whose stocks are valued at $23,000 finds this to be greater by 15% than that of his nearest competitor. What is the value of the latter's stock? (5) In a newspaper clipping of recent date mention is made that coffee has increased in price by 12%. What was the coffee, now selling at 28 cents, worth? (6) In September eggs were selling for 30 cents per dozen, which was a drop of 16⅔% in price. What were they selling them for before?

Written—(1) The attendance of pupils at school during May was 2,544, which was 6% more than attended during April. What was the attendance for April? (2)The population of a certain town has increased 12½% during the past three years. If the present population is 40,590, what was it three years ago? (3) A farmer's wheat crop this year is 15½% greater than last year's crop. What was last year's crop if in the 2 years he raised 1,293 bushels? (4) A boat load of wheat was so damaged that it sold for $8,500, which was 15% less than its original value. What was its value before it was damaged? (5) After paying 37½% of his debts a man found that the remainder could be paid with $13,025. What was his original indebtedness? (6) An orange tree yielded 50% more oranges the second time it bore than the first time. If the second crop amounted to 420 oranges, how many were there in the first crop? (7) The rice crop of Japan one year was 2,046 million bushels, or 7% less than normal. What is the normal crop? (8) If the increase in living has been 25% within the past 5 years, what was the price of the following articles 5 years ago?

Apples	pk.	$.35	
Apricots	can	.25	
Baking powder	½ lb. can	.20	
Bread	loaf	.05	
Butter	lb.	.28	
Cabbage	lb. 2c., head	.10	
Cauliflower	head	.15	
Celery	bunch	.10	
Cheese	lb.	.15	
Coffee	lb.	.30	
Crackers	lb.	.10	
Eggs	doz.	.25	
Flour	25 lb. sack	.50	
Lemons	doz.	.25	
Lettuce	bunch	.05	
Lima Beans	can	.10	
Milk	qt.	.06½	
Oatmeal	2 lb. pkg.	10	
Olives	pt.	$.30	
Onions	pk.	.20	
Oranges	doz.	.30	
Peaches	can	.25	
Pears	can	.25	
Pickles	doz.	.10	
Peas	can	.12½	
Potatoes	pk.	.25	
Prunes	lb.	.10	
Rice	lb.	.08⅓	
Rolls	doz.	.10	
Salt	lb.	.05	
Soap	bar	.05	
Starch	lb.	.10	
Sugar	lb.	.05	
Tea	lb.	.60	
Tomatoes	can	.15	

Third Week.

Profit and loss—Oral and drill.

(a) Buying price $75; selling price $100; gain %? (b) Selling price

$100; buying price $75; loss %? (c) Buying price $75; gain 25%; selling price? (d) Buying price $75; loss 10%; selling price? (e) Selling price $60; loss 33⅓%; buying price? (f) Selling price $60; gain 33⅓%; buying price?

A boy buys newspapers at the rate of 60 cents per 100, what per cent. does he gain by selling them at 1 cent each?

A lot of damaged dry goods is to be sold at 25% below cost. Find the selling price of goods costing per yard (a) 8 cents; (b) 10 cents; (c) 12½ cents; (d) 15 cents; (e) 18 cents.

Find the gain per cent. on a farm bought for $25,000 and sold for $36,000.

A book costing $2 is marked to be sold at 40% advance. (a) What is the marked price? It is sold at 20% less than the marked price. (b) Find the selling price. (c) Find the profit. (d) Find the gain per cent.

Use one day of this week for cost accounts and balance to show profits and losses.

Written—(1) What per cent. is gained by selling tea at 55 cents per pound, if it costs 40 cents? (2) A fruit dealer paid $30 for 2 cases of washed figs, each case holding 100 one-pound baskets. At what price per basket did he sell the figs if he gained 33⅓%? (3) A dealer bought a small piano for $320 and sold it for $400. What was his gain per cent.? (4) A grocer bought 500 pounds of coffee at 32 cents a pound. He sold it at an advance of 6¼%. How much did he gain? (5) In selling an article the manufacturer made a profit of 25%. If the customer paid $6.44 for the article, what was the cost of manufacture? (6) A real estate dealer bought 80 acres of land for $3,000 and sold it at a profit of $7.50 an acre. What was the gain per cent.? (7) What was the cost of hats sold at $1.00 apiece, which was at a loss of 16⅔%? (8) Silk sold at $5.50 a yard brings in a profit of 10%. What did it cost? (9) Two pictures were sold for 99 cents each. On one there was a gain of 10%; on the other a loss of 10%. Was there a gain or a loss on the sale, or both, and how much?

Fourth Week.

Commercial discount (first case of percentage only.)—Terms used; Net amount, list price, gross price, catalogue price.

Oral and drill—(1) Net amount of $200 at discount of 10%? (2) List price $150; discount 20%; net amount? (3) List price $250; discount 20% and 2% off for cash; net amount? (4) Find the net cost of a piece of glass listed at $3.60 and discounted 25%. (5) A merchant sold a bill of goods amounting to $4.50, on which he allowed 20% discount. What was the net amount of the bill? (6) Find the net amount of a bill of $18, the discount being 11 1/9%. (7) What is the net amount of a bill of $450, the discount being 33⅓% and 20%? (8) A piano listed at $450 is sold less 33⅓% and 10%. What is the net cost to the purchaser? (9) What single discount is equivalent to discounts of 20% and 25%? (10) What single discount is equivalent to discounts of 50%, 20% and 10%?

Written—(1) Mr. Bannister, who has a wholesale hardware store, sold

Mr. Atwood a bill of articles amounting to $750 and allowed him 20% and 10% off. What did Mr. Atwood pay for his articles? (2) Mr. Van Nest bought 25 dozen brass hooks at $2.50 a dozen. He was allowed 15% and 5% off. What did he pay for the hooks? (3) How much less would they have cost him if he had been allowed 20% discount? (4) Mr. Bigelow bought a bill of goods amounting to $3,000. He was allowed 15%, 10% and 5% off. What did the goods cost him? (5) A hardware dealer offered a bill of goods to a customer for $1,200, with a discount of ¼ off, or a discount of 15%, 10% and 5%. The customer accepted the first proposition. Why was it the better one?

It would now be advisable to review bills and statements with the terms of payment given.

Fifth Week.

Taxes and duties—Terms: Direct and indirect taxes, assessed value, assessor, ad valorem duty, specific duty, internal revenue.

It would be advisable to bring tax bills, to get statistics of the state and city revenue of recent years, and to obtain copies of tariff lists and give problems directly from these. Review foreign money.

Oral and drill—(1) Find the tax on the following property: $1,500 at 3 mills. (2) Find the tax on $3,000 at 1½%. (3) $12,000 at $15 on $1,000. (4) At how many mills on the dollar must property be taxed to raise $3,000, the assessed value being $150,000? (5) The duty on musical instruments is 45%. What will it cost to import a Stradivarius violin valued at $1,000?

Written—(1) What per cent. of the cost is paid on pearl-handled table knives valued at $3 per dozen, the rate being $.16 each and 15%? (2) Find the entire cost in this country of 2,000 pounds of macaroni bought in Italy for 500 lire, if the duty was 1½ cents per pound and the freight charges were $10.60. (3) Find the duty on 25,000 cigars, invoiced at $62.50 per M, weighing on an average 10½ ounces per box of 50 cigars. The tariff rate is $4.50 per pound and 25% ad valorem. (4) The tax rate in the City of New York was recently announced as "1.55408 per centum." At that rate find the tax on property assessed for $5,400. (5) The assessed valuation of property in a village was $3,200,000. What tax rate was necessary to raise $16,800 by taxes?

Sixth Week.

Interest and amount—Terms: Base, rate, percentage, amount.

In teaching interest I have found that pupils readily adopt the cancellation method. By this time they can be led to see that P. × R. × T. = Int. and this is another reason why the cancellation method may be here adopted. The year method is also a good one. Take the interest of one year in the principal at the given per cent. Then multiply by the number of years and fraction of years. Add

Oral and drill—(1) At 5% how much is the interest of $400 for 1 year? For 6 months? For 2 years? For 2 years 6 months? (2) At 6% how much is the interest of $500 for 1 year? For 2 years? For 2½ years?

For 8 months or ⅔ year? (3) At 6% what is the interest of $500 for 6 months? (4) At 5% what is the interest of $800 for 1 year 6 months?

Written—Find the interest and amount at 6%, 4%, 4½%, 3%, and 5% on: (1) $6,440 for 63 days. (2) $1,200 for 2 years 7 months 3 days. (3) A man lived on the income from $50,000. If ¼ of it was invested at 7% and the rest at 5% find his annual income.

Seventh Week.

Promissory notes—Terms: Negotiable, non-negotiable, maker or drawer, payee, face, date of maturity, indorser, etc. Time and demand notes,

Practice in writing various kinds of notes. Examples in finding interests on money loaned. Have pupils bring in notes of various kinds. The following are some of the points concerning promissory notes to be discussed toward the end of the week:

Notes written in pencil.

Notes dated on a Sunday.

Notes signed by minors.

Drill in time between dates.

How many days from October 15 to date?

How many days between February 26, 1908 and March 31, 1908?

What is the date of maturity of a 60 day note dated April 6? Etc.

Written work should consist in drawing up various kinds of notes and reviewing interest.

Eighth Week.

Bank discount—Terms: Terms of discount, bank discount, proceeds, date of maturity, face.

It would be best not to give interest bearing notes, in this grade. In fact, I believe that they should not be taught in any grade, as this form has become obsolete in the business world. The face of the note now shows the amount to be paid on day of maturity. Here would be the place to teach how business men keep a record of their promissory notes by means of entry in a book, one side of which is marked bills payable and the other side bills receivable.

Business banks and the drawing up of checks might be taken up during this week.

Give examples in bank discount similar to the following:

(1) Find the proceeds on $75, discounted for 30 days at 6%. (2) On $150, discounted for 90 days at 6%. (3) On a 60 day note for $300, dated October 12, without interest, and discounted November 1 at 6%.

Monthly test.

Ninth Week.

Areas and perimeters of rectangles. Area of triangle when base and altitude is given.

In teaching areas, have small objects measured first, such as a piece of note paper, the pupil's desk, the black board, etc. First have the pupils find the unit measurement, which will be the square inch in measuring their

desks. Then let them find out how many of these square inches will cover one row. The product of this with the number of rows should then be taken. After getting them to understand the principle of measurement, tell them that multiplying length × width is a short method.

Oral and drill—(1) How much blotting paper would you need to cover your desk? (2) I wish to cover a table 4 feet long 27 inches wide with oil cloth. How much will I need?

Written—Find surfaces of floors, halls, etc.

Teach area of triangle. Terms: Base, altitude, diagonal. Take large rectangular card board. Cut diagonally in two. Let them give you the area of the rectangle. Show them that one of the two triangles is equal to one-half the area of the rectangle. Both have the same base and altitude. Then the area of a triangle must be ½ base × altitude if area of a rectangle is base × altitude.

(1) How many square feet in a floor 10 feet 6 inches long, 15 feet 8 inches wide? (2) How many yards of oil cloth will be needed to cover a hall 9 feet wide and 120 feet long, making no allowance for waste? (3) What is the area of a triangular lot which is for sale, the dimensions of which are, base 75 feet, altitude 21½ feet?

Tenth Week.

Surfaces, volumes, rectangular solids, areas of rooms, difference between surface and volume. The latter may be taught in the same way as surface. One inch cubes might be piled up into large cubes and square and rectangular prisms.

Oral and drill—(1) Measure the dimensions of a crayon box and find out how many square inches in its entire outer surface. (2) Find the area of the walls and ceiling of a room 3 yards x 5 yards x 4 yards. (Also volume.) (3) A right prism 8 feet high and a triangular base 4 inches by 5 inches altitude. Find area. (Show how volume is found.) (4) Find the surface of a prism the base of which is a triangle, with a base of 3 inches, altitude 4 inches. Height of prism 8 inches. (Also volume.)

Examples in volume.

*Written—(1) How many square yards in the side walls and ceiling of a room 12 feet by 9 feet and 8 feet high? (2) How many square feet in the side walls of a room 16 feet by 8½ feet and 8 feet high? (3) How many square feet of zinc will it take to line the sides of a tank which is 18 inches by 20 inches and 8 inches deep? (Think of a room bottom side up.) (4) What would be the amount of air the room in example 1 could hold? (5) How many cubic feet of water would the tank in example 3 hold?

*Mid-term test.

Arithmetic—8A

SECOND WEEK.

Application of the five cases of percentage to profit and loss, commission, commercial, discount, taxes, etc.

Oral and Drill—Drill in the five cases of percentage, as in the first week.

Oral—Everett earned $1.50 and spent 20% of it for books. How much had he left?

If 40 acres, or 25%, of Mr. Carter's farm is pasture, how many acres in the whole farm?

A clerk receiving $20 a week had his wages increased $5. What was the per cent. of increase? What per cent. of his former wages did he then receive?

An agent sold 24 reapers in one month, and 16⅔% more the next month. How many in both months?

What per cent. of profit does a selling price of $.64 represent if the cost is $.40?

A newsboy buys papers at ½ cent each, and sells them at a cent apiece. What per cent does he make?

What is the net cost of a bill of goods amounting to $560, 12½% off?

What is the premium for insuring a house for $3,200 at ⅞%?

An article was sold for $56, at a loss of 20%. Find the cost and the loss.

If you bought a bill of goods amounting to $25, with a trade discount of 20% and 50% off for cash, what would be the net amount of the bill?

A collector's commission at 3% for collecting a debt was $60. How much did he collect?

An agent charged $100 for selling a farm for $2,000. What was the rate of his commission?

Written—Mr. Carpenter paid $3,680 for a house and lot. After laying out $148 in repairs, and paying a tax bill of $52, he rented the property for a year at a profit of 12½% on the investment. Find the income?

Mr. Foster has received the following offers for a lot of land which cost him $1,650: (1) $240 more than he paid; (2) 14% more than he paid. Which is the best offer, and by how much?

Three boys, John, James and Henry earned together $550 in a year; John earned 30%; James 40% of the remainder, and Henry what remained. Find how much each earned. I owe a debt of $375.50. If I pay 30% of it at one time, and 40% of the remainder at another time, how much do I still owe?

The operating expenses of a factory are 37½% of the sales. If the sales for a year amount to $650,450, how much are the operating expenses?

A horse and buggy cost $300. If the cost of the horse was 200% of the cost of the buggy, what was the cost of each?

A bankrupt sold his property for $4,000, which was 18% less than its real value. If it had sold for $5,250, what per cent. above its real value would it have brought?

A clothier has two grades of hats; the cheaper grade he buys for $2 and sells for $3. What per cent does he make?

The gross proceeds of a sale of strawberries were $506. The charges were: express, $3.75; cartage, $2.80; agent's commission, 5%. Find the net proceeds.

Baker & Gates, commission merchants, charged $6.65 for selling 76 barrels of potatoes at $1.75 per barrel. Find the per cent. of their commission.

Mr. Sladin sent 240 bushels of pears to Davis & Frost, commission merchants; 15% of the shipment was worthless, and the remainder was sold at 75 cents a bushel. Find the Davis & Frost commission at 3½%.

What per cent. commission is charged by an agent who retains $49.20 and remits $1,590.80 to his employer?

$$\frac{\$16.50}{\quad}$$

At a clearance sale in a clothing store the tag on the suit reads $11.00; the figures above the line mean the ordinary price; the figures below, the present price. What is per cent of reduction?

A carriage manufacturer lists a certain style of carriage at $350 with successive discount of 40% and 20% and 5%. Find net price.

What premium will insure the safe shipment of 600 barrels of flour worth $5.80 a barrel, if the rate is ¾%?

At ¾% Mr. Wilbur paid a premium of $18 for insuring his property for ⅔ of its value. Find the face of the policy.

The value of the real property is $3,450,000; the value of the personal property is $3,750,000. It is necessary to raise $74,400. What rate must be declared?

What is the actual cost to the importer of a suit of clothes bought in England for £4, on which is paid an ad valorem duty of 40%?

At 60 cents a square yard and 40 cents ad valorem, what is the duty on a rug 18 feet by 9 feet, costing in Germany 5 marks a square yard.

Third Week.

Interest and amount—simple and exact.

In the problems of simple interest pupils may use either the cancellation, year, or 60 days (bankers) method, according to the problems.

Exact interest is used by the United States Government and a few merchants and bankers. Although it is legal, yet the convenience of the 360 day rule commends the latter to the public favor.

Oral and Drill—Find interest at 6% on: $600 for 93 days; $300 for 42 days; $200 for 66 days; $150 for 44 days; $120 for 55 days.

What is the interest on $1 for 1 year at 6%? 4 years? 5 years? 8 years?

What is the interest on $10 for 2 years at 6%? on $30? on $25? on $80? For 5 years at 6%?

What is the interest on $1 for 1 month at 6%? at 4%? at 3%? at 3½%? at 8%? at 5%?

To change common interest to exact interest.

On a basis of 12 periods of 30 days each, a year's interest is taken for too short a period, since a year, exclusive of a leap year, contains 365 days.

The time is, therefore, five days or 5/365, equal to 1/73 too short, and the interest taken on that basis is proportionally too great.

Written—A gentleman bought a span of horses for $1,800, paying $1,000 down. For the balance he gave his note for two years four months at 6% interest. What was the amount due on the note?

I bought a house and lot in Flushing for $4,500, paying $2,000 cash. I gave a mortgage for the balance, due in 3 years, 6 months at 6%. What was the amount of the mortgage when due?

A grocer borrows $400 at 6% interest, and with it purchases pork at $16 a barrel. During the next 14 months he sold it all at an advance of 25%. How much was his net amount?

I loan a merchant $600 for 3 years at 6%, and trade with him during the time to the amount of $275. How much will he pay me back if he charges no interest on the goods sold me?

Find the amount due on $900 for 1 year 3 months 6 days at 6%.

What is the interest on $760 for 3 years 4 months 12 days at 6%?

Find the interest on a 3 months' note for $1,800, dated April 15, 1892 at 6% exact number of days.

A debt of $40.50 was paid May 21, 1892, with interest of 6% from November 9, 1886. What was the amount paid?

What is the amount of $240 on interest at 5% for 1 year 7 months and 15 days?

Find the difference between the accurate interest and simple interest on $800 from April 1, to November 6 at 5%.

What is exact interest at 6% on $1,800 for the first 3 months for year 1912?

What is the exact interest on a United States $1,000 bond at 5% from November 1, 1890 to April 10, 1891?

Fourth Week.

Use of Interest Tables—Weekly test. As most large business houses and all banks, instead of computing interest make use of the interest tables, this would be the place to teach them how to use these tables intelligently and accurately.

Drill—For convenience, bankers often use the following:

Table of Days Intervening Between Dates.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Jan. ...	365	31	59	90	120	151	181	212	243	273	304	334
Feb. ...	334	365	28	59	89	120	150	181	212	242	273	303
Mar. ..	306	337	365	31	61	92	122	153	184	214	245	275
Apr. ..	275	306	334	365	30	61	91	122	153	183	214	244
May ...	245	276	304	335	365	31	61	92	123	153	184	214
June ..	214	245	273	304	333	365	30	61	92	122	153	183
July ...	184	215	243	274	304	335	365	31	62	92	123	153
Aug. ..	153	184	212	243	273	304	334	365	31	61	92	122
Sept. ..	122	153	181	212	242	273	303	334	365	30	61	91
Oct. ...	92	123	151	182	212	243	273	304	335	365	31	61
Nov. ..	61	92	120	151	181	212	242	273	304	334	365	30
Dec. ...	31	62	90	121	151	182	212	243	274	304	335	365

The number of days from any day of one month to the *same* day of another month is found by starting at the name of the first (in the left-hand column) and following across to the column headed with the name of the second. (Should February 29 of a leap year intervene between dates, add 1 day.)

APPLICATIONS OF PERCENTAGE

INTEREST TABLE. INTEREST AT 6%

Da.	$100	$200	$300	$400	$500	$600	$700	$800	$900	$1000	Da.
1	0.017	0.033	0.050	0.067	0.083	0.100	0.117	0.133	0.150	0.167	1
2	0.033	0.067	0.100	0.133	0.167	0.200	0.233	0.267	0.300	0.333	2
3	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500	3
4	0.067	0.133	0.200	0.267	0.333	0.400	0.467	0.533	0.600	0.667	4
5	0.083	0.167	0.250	0.333	0.417	0.500	0.583	0.667	0 750	0.833	5
6	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900	1.000	6
7	0.117	0.233	0.350	0.467	0.583	0.700	0.817	0.933	1.050	1.167	7
8	0.133	0.267	0.400	0.533	0.667	0.800	0.933	1.067	1.200	1.333	8
9	0.150	0.300	0.450	0.600	0.750	0.900	1.050	1.200	1.350	1.500	9
10	0.167	0.333	0.500	0.667	0.833	1.000	1.167	1.333	1.500	1.667	10
11	0.183	0.367	0.550	0.733	0.917	1.100	1.283	1.467	1.650	1.833	11
12	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800	2.000	12
13	0.217	0.433	0.650	0.867	1.083	1.300	1.517	1.733	1.950	2.167	13
14	0.233	0.467	0.700	0.933	1.167	1.400	1.633	1.867	2.100	2.333	14
15	0.250	0.500	0.750	1.000	1.250	1.500	1.750	2.000	2.250	2.500	15
16	0.267	0.533	0.800	1.067	1.333	1.600	1.867	2.133	2.400	2.667	16
17	0.283	0.567	0.850	1.133	1.417	1.700	1.983	2.267	2.550	2.833	17
18	0.300	0.600	0.900	1.200	1.500	1.800	2.100	2.400	2.700	3.000	18
19	0.317	0.633	0.950	1.267	1.583	1.900	2.217	2.533	2.850	3.167	19
20	0.333	0.667	1.000	1.333	1.667	2.000	2.333	2.667	3.000	3.333	20
21	0.350	0.700	1.050	1.400	1.750	2.100	2.450	2.800	3.150	3.500	21
22	0.367	0.733	1.100	1.467	1.833	2.200	2.567	2.933	3.300	3.667	22
23	0.383	0.767	1.150	1.533	1.917	2.300	2.683	3.067	3.450	3.833	23
24	0.400	0.800	1.200	1.600	2.000	2.400	2.800	3.200	3.600	4.000	24
25	0.417	0.833	1.250	1.667	2.083	2.500	2.917	3.333	3.750	4.167	25
26	0.433	0.867	1.300	1.733	2.167	2.600	3.033	3.467	3.900	4.333	26
27	0.450	0.900	1.350	1.800	2.250	2.700	3.150	3.600	4.050	4.500	27
28	0.467	0.933	1.400	1.867	2.333	2.800	3.267	3.733	4.200	4.667	28
29	0.483	0.967	1.450	1.933	2.417	2.900	3.384	3.867	4.350	4.833	29

Mo.	$100	$200	$300	$400	$500	$600	$700	$800	$900	$1000	Mo.
1	0.500	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500	5.000	1
2	1.000	2.000	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	2
3	1.500	3.000	4.500	6.000	7.500	9.000	10.500	12.000	13.500	15.000	3
4	2.000	4.000	6.000	8.000	10.000	12.000	14.000	16.000	18.000	20.000	4
5	2.500	5.000	7.500	10.000	12.500	15.000	17.500	20.000	22.500	25.000	5
6	3.000	6.000	9.000	12.000	15.000	18.000	21.000	24.000	27.000	30.000	6
7	3.500	7.000	10.500	14.000	17.500	21.000	24.500	28.000	31.500	35.000	7
8	4.000	8.000	12.000	16.000	20.000	24.000	28.000	32.000	36 000	40.000	8
9	4.500	9.000	13.500	18.000	22.500	27.000	31.500	36.000	40.500	45.000	9
10	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	10
11	5.500	11.000	16.500	22.000	27.500	33.000	38.500	44.000	49.500	55.000	11

Yr.	$100	$200	$300	$400	$500	$600	$700	$800	$900	$1000	Yr.
1	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00	1
2	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00	108.00	120.00	2
3	18.00	36.00	54.00	72.00	90.00	108.00	126.00	144.00	162.00	180.00	3
4	24.00	48.00	72.00	96.00	120.00	144.00	168.00	192.00	216.00	240.00	4
5	30.00	60.00	90.00	120.00	150.00	180.00	210.00	240.00	270.00	300.00	5

Suppose it is required to find the number of days from June 5 to November 10. From the table we find that it is 153 days from June 5 to November 5; adding 5 days, we find the required time to be 158 days.

Find by the use of the table, the number of days in the following: (1) March 6 to May 5. (2) April 10 to July 9. (3) June 2 to July 5. (4) July 5 to November 2. (5) August 8 to October 7. (6) September 1 to December 3. (7) November 30 to February 1. (8) July 25 to November 22. (9) June 30 to August 2. (10) September 26 to November 15. (11) August 21 to September 4. (12) December 22 to January 7. (13) May 4 to July 1. (14) November 6 to February 2.

Written—In order to show the pupils the benefit of the interest table have them work a few examples both ways.

Fifth Week.

Bank Discount—Review of terms: Negotiable, non-negotiable, payer, payee, etc.

Drill and Oral—Time between dates. Use the table of days (see Fourth Week).

Promissory notes written and addressed. Methods of procedure in collecting notes. Law prescribing excessive rates.

Written—Interest bearing notes may be given, although rarely used in business, as the exercise will act as a review of interest.

Solve—(1) On March 1, a house was sold for $6,000; the purchaser paid $1,000, gave a mortgage for $3,000, and his note at 90 days for the balance; on March 17, holder of the note had it discounted at 6% per annum. How much did he receive? (2) A man held a 6 months' non-interest bearing note for $4,000 dated April 1; on April 16 he needed $2,600 and had to discount the note at 6%; after paying his debt he deposited the balance. How much did he deposit? (3) Mr. Brown bought a house for $1,500. He paid $700 in cash and $800 by note at 5%, payable semi-annually. What was the amount of interest due at each payment? (4) Mr. Lee bought a threshing machine for $300. He paid $150 in cash, and gave his note for the rest with interest at 6%, payable annually. What was the amount of interest due at each payment? (5) A 30 day note for $5,000, without interest, dated August 27; discounted August 27 at 6%. (6) A 15 day note for $10,000, without interest, dated May 1, discounted immediately at 5%. (7) A 90 day note for $7,500, without interest, dated November 18; discounted November 19 at 6%. (8) A 30 day note for $3,000, with interest at 5%, dated July 3, discounted July 5 at 6%. (9) A 45 day note for $60,000, with interest at 4%, dated December 28, discounted January 2, at 5%. (10) A note for $1,200 on interest for 3 months, at 6%, dated July 17, discounted September 1, at 4%. (11) A 10 day note for $1,000, discounted at 3½% on the day it was made.

Sixth Week.

Compound Interest—Use of interest tables in compound interest.

Drill and Oral—The savings bank. How interest is paid there. What interest would you get on $100 from the Williamsburgh Savings Bank on July 1, 1913, if you deposited $100 there on January 1, 1912, interest being 4%? Other examples like above may be given. Use table frequently.

Written—A small portion of a compound interest table is given below:
AMOUNT OF $1 AT COMPOUND INTEREST, COMPOUNDED ANNUALLY:

Years.	Rate: 2%	2½%	3%	4%	5%
1	1.02000	1.02500	1.03000	1.04000	1.05000
2	1.04040	1.05063	1.06090	1.08160	1.10250
3	1.06121	1.07689	1.09273	1.12486	1.15763
4	1.08243	1.10381	1.12551	1.16986	1.21551
5	1.10408	1.13141	1.15927	1.21665	1.27628
6	1.12616	1.15969	1.19405	1.26532	1.34010
7	1.14869	1.18869	1.22987	1.31593	1.40710
8	1.17166	1.21840	1.26677	1.36857	1.47746
9	1.19509	1.24886	1.30477	1.42331	1.55132
10	1.21899	1.28008	1.34392	1.48024	1.62889
11	1.24337	1.31249	1.38423	1.53945	1.71033

How much can one accumulate in 10 years, by depositing $800 annually, interest 4% compounded annually?

To what will an annual payment of $564 for 10 years amount, interest 3½%, compounded annually?

What may one draw at the end of 10 years if he regularly deposits $400 semi-annually in a savings bank paying 4%, payable semi-annually?

If one can invest $600 yearly from his salary where it will yield him 6% yearly, and can keep all the interest invested at the same rate as fast as it occurs, how much can he accumulate in 20 years?

On his sixth birthday, and on each succeeding birthday, including his twenty-first, a man gave his son $100, which, together with the interest, was kept in a savings bank paying 4% interest annually. How much had the young man to his credit from this source on his twenty-first birthday?

A dealer sold an automobile for $1,000, receiving $400 cash and a note for the rest due in 3 years, with interest at 6%, payable semi-annually. How much interest was paid on the note altogether?

A farmer borrowed $600 on three equal notes; one due in 1 year; the second in 2 years, and the third in 3 years; all with interest at 5%, payable annually. How much was paid at the end of each year, if all payments were made when due? What was the total amount of interest paid?

Mr. Perkins bought a house and lot for $6,000; he paid $900 cash and gave three notes of equal amounts for the balance, due respectively in 4, 8 and 12 months, with interest at 4½%. What sum was due at each payment?

Mr. Williams purchased an apartment building for $1,200. He paid $4,000 cash and gave five notes of equal amounts for the rest, payable respectively 6, 12, 18, 24 and 30 months after date, with interest at 5%, semi-annually. What was each semi-annual payment?

A firm accepted the following settlement of an account amounting to $2,050: A note for $1,000, due in 3 months; one for $500, due in 6 months, and one for $550, due in 1 year; all bearing 6%. What was the amount of these notes? Would the firm have received more or less by accepting a note for $2,050 for 6 months at 6%?

Seventh Week.

The equations—Removal of parenthesis—Changing of signs.

Oral and Drill—$x + 2 = 6$; $x - 3 = 8$; $2x - 4 = 11$; $2x - 6 = 4$; $3x + 8 = 17$; $4 - x = 3$. Then drill on following: $x/2 = 4$; $x/3 = 2$; $x/4 = 6$; $2x/3 = 2$; $3x/4 = 6$; $5x/6 = 5$. Then: $x/2 + \frac{2}{3} = 4$; $x/3 - x/4 = 6$; $x/2 + x/4 = 8$; $x/2 = 8 - x/4$; $\frac{3}{4}x = 9$; $\frac{5}{8}x = 10$; $7x/11 = 14$; $3/2x = 9$; $\frac{4}{5}x = 12$; $5/3x = 20$; $7/5x = 14$; $9x/7 = 18$; $10x/4 = 15$.

Written—$7/3x = 2x + 2$; $x - 13 = 4/3$; $3x/5 - 10 = 7x/10 - 3$; $x/2 + x/3 + x/4 = 26$; $x/2 + x/3 = x/4 + 7$; $x/2 + x/3 = x - 7$; $x/2 + x/3 = 13 - x/4$; $4x/5 - 5x/7 = x - 8$; $4x/x11 = 3$; $2x/3 - 3x/4 = 5x/6 - 4\frac{1}{2} - 13x/24$; $x - 3/4 - x - 1/3 = x - 4$; $x - (4 + 2x) = 8$; $2x = 8\ (4 - x)$; $3 + x = -7x - 4 + 9x)$; $12 - 3x + 4/6 = 8$; $2x + 6 - (4 + x) = 2x$.

Eighth Week.

The Equation—Practical problems solved by algebra—Multiple and Power.

Oral and Drill—Drill on examples similar to those in Seventh Week.

Definition of Multiple and Power:

Multiple—A number that is divisible by another.

Power—The result of taking the number two or more times.

Oral—(1) What power of 3 is $3 \times 3 \times 3 \times 3$ or 81? (2) What power of 5 is $5 \times 5 \times 5 \times 5 \times 5$, or 3, 125? (3) What is the square or second power of 2? of 3? of 5? (4) What is the cube or third power of 2? of 3? of 5? (5) What is the area of a square whose side is 4 inches? (6) What is the volume of a cube whose side is 4 inches? (7) 100 is what power of 10? 1,000 is what power of 10? Give multiples of 2, 3, 4, 5, 6. Give powers of same numbers.

Written—(1) A house and lot, sold at a gain of 10%, brought $2,200. What was its former cost? (2) A hardware dealer sold a furnace for $180, at a gain of 5%. What did the furnace cost him? (3) A merchant sold a damaged carpet for $42.50, at a loss of 15%. What did the carpet cost him? (4) A collector remitted $475 after deducting a fee of 5%. How many dollars did he collect? (5) The amount of a certain principal at 4% interest for 1 year was $416. What was the principal? (6) A sum of money less 20% is $960. What is the sum of money? (7) A commission merchant remitted $1,900, after deducting a commission of 5%. On how much did he reckon his commission? (8) A man's salary was increased $\frac{1}{5}$ of itself; he then received $1,800. What was his salary before the increase? (9) George thought of a number, doubled it, added 15, divided by 5 and obtained 5. (10) A capital is invested thus: $\frac{1}{2}$ at $5\frac{1}{2}\%$, $\frac{1}{3}$ at 6% and the remainder at $4\frac{1}{2}\%$. The annual income is $605. What is the capital? (11) By investing $\frac{1}{4}$ of his capital at 3%, and the remainder at 6%, Mr. White received $10 a year more than by investing the whole capital at 5%. What is his capital. (12) A man sold some of his land at $400 per acre. He invested the proceeds at 5%, and found his daily (365 days = 1 year) income from his investment to be $1.50. How many acres did he sell? (13) The price of wheat was $78\frac{1}{2}$ cents on Wednesday. It rose a certain amount on

Thursday, and half as much on Friday, when the price was 80 cents. What was the price on Thursday? (14) A merchant bought two canisters of coffee, fifty pounds each, for $23.25. One kind cost 4½ cents more per pound than the other. What was the price per pound of each? (15) Goods are sold for $1,620 at a loss of 10%. What did they cost?

Ninth Week.

Ratio—Meaning.

Terms—Antecedent and consequent.

Direct ratio—Dividing antecedent by consequent.

Inverse ratio—Dividing consequent by antecedent.

Utility—Saves labor, because cancellation can be used.

Oral and Drill—What is the ratio of 1 quart, 1 pint to 1 gallon? What is the ratio of 1 foot 3 inches to 1 yard?

Make up and work a similar example concerning pecks, quarts and bushels.

Reduce the following to ratios, having 1 for the first term: (1) 7 : 35. (2) 5 : 32. (3) ½ : 4. (4) .3 : 6. (5) .01 : 4.

Written—Reduce the following ratios, having 1 for the first term: (1) 117 : 324. (2) 10.9 : 650. (3) .0002 : .0725. What is the approximate ratio of New York to that of Texas? Of Rhode Island to Texas? Make up and work two similar examples involving the area of your own State. A boat runs 30 miles in 2 hours. How many miles will it run in 6 hours at the same rate. In 12 hours? In 20 hours? A steamboat runs 72 knots in three hours. How many knots will it run in 18 hours at the same rate? In 15 hours? In 30 hours? In 16½ hours? In 1½ hours? The sum of one number and twice another is 11. The difference of the two numbers is 5. Find the numbers. The sum of two numbers is 13. Twice the first number minus 3 times the second is 1. Find the numbers. A clock ticks 7 times in 5 seconds. How many times does it tick in 2 days 6 hours? If 60 acres cost $3,000, how many acres will cost $2,450? The food parts of beef are water, fat, and protein. In 1 pound of loin steak there are 8⅖ ounces of water, 2⅘ ounces of fat, 2⅗ ounces protein, and 2⅕ ounces of waste material. How much of each of these parts are there in 3 pounds of loin steak? In 5½ pounds? In a 12-pound loin steak?

Tenth Week.

Proportion—Terms—means, extremes.

Pupils gather principles of proportion after working several proportion examples. The following principles should be deduced:

Product of means—product of extremes.

Product of extremes divided by one mean = the other mean.

Product of means divided by one extreme = the other extreme.

Oral and Drill—Solve the following proportions: (1) 30 : 5 = 12 : x. (2) 10 : 5 = x : 7. (3) 15 : x = 3 : 6. (4) 15 : x = 6 : 2. (5) 15 : x = 10 : 2. (6) 5 : 20 = x : 32. (7) ½ : ¾ = x : 1. (8) x : ⅔ = ½ : ¼. (9) 15/45 men = ?/180. (10) 20/6 = 60/? ounces. (11) 25/75 = ?/36. Find the missing terms: (12) 2 ounces : 1 pound : : $3 : $x. (13) 5 cents : $2 : : x yards : 80 yards.

Arithmetic—8B

THIRD WEEK.

Drill—Decimal—Fraction. 100% = ?; 50% = ?; 33⅓% = ?; 66⅔% = ?; 25% = ?; 75% = ?; 20% = ?; 60% = ?; 16⅔% = ?; 83⅓% = ?; 12½% = ?; 37½% = ?; 62½% = ?; 87½% = ?; ½% = ?; ¼% = ?; ⅛% = ?

Find—3% of 400; 5% of $150; 60% of 300 bushels; 8% of 75; 25% of 800; 150% of 3,500; 12½% of 640; 75% of 160 acres. A man had 150 sheep and sold 40% of them. How many sheep did he sell? In a spelling lesson of 40 words, a boy spelled 80% correctly. How many words did he spell correctly?

Written—The daily attendance in a school is 2,400, which is 96% of the registered number of pupils. How many pupils are registered? I sold my house for $4,578, which was 84% of its cost. What was its cost? My salary is $250 a month, which is 25% more than it was last year. What was my salary per month last year? 100% of last year's salary = last year's salary. 125% of last year's salary = present salary or $250.

$250 ÷ $1.25 = $200.—Ans.

The weight of marble is about 33⅓% of the weight of wrought iron. If marble weighs 160 pounds to the cubic foot, what is the weight of 3 cubic feet of wrought iron? A cubic foot of ice weighs about 8% less than a cubic foot of water. If a cubic foot of ice weighs 57.5 pounds, what is the weight of a cubic foot of water? The growth in population in 10 years in a city was 12%. Its present population is 224,000. What was its population 10 years ago? What number increased by 18% of itself is equal to 1,475? What number diminished by 18% of itself is equal to 6,150? Water weighs 62.5 pounds to the cubic foot, and cast iron weighs 450 pounds to the cubic foot. What per cent. of the weight of cast iron is the weight of water? What per cent. of the weight of water is the weight of cast iron? What per cent. of a bushel is 3 pecks 4 quarts? There are 18 boys and 24 girls registered in a class. What per cent. of the class is boys? A bankrupt owes $7,560 and has only $4,914. What per cent. of his debts can he pay? In playing tennis a boy won 60% of his games, losing 8 games. How many games did he win? A house worth $5,500 was damaged $1,500 by fire. What was the per cent. of damage? The diameter of a circle is what per cent. of its circumference? Bought paper at $3 a ream and sold it at 25 cents a quire. What was the gain per cent.? An architect charged ¼% of the cost of a building for plans and specifications, and ½% for superintending the construction of the building. If the building cost $6,000, what was his total commission?

FOURTH WEEK.

Profit and loss, commercial discount, invoices, rapid addition drill.

Oral—A dealer has sold an article for 75% of ¾ of its cost. What per cent. has he lost? A lot of damaged dry goods is to be sold at 25% below cost. Find the selling price of goods costing per yard: (a) 8 cents; (b) 10 cents; (c) 12½ cents; (d) 15 cents; (e) 18 cents. Find the gain per cent. on a farm bought for 25 thousand dollars, and sold for 36 thousand dollars.

A boy buys newspapers at the rate of 60 cents per 100. What per cent. does he gain selling them at 1 cent each? A man sells an article for 4 times its cost. What per cent. profit does he realize? Find the sum required for settling a bill of goods listed $300, with a discount of 25% and a discount of 4% for cash. A builder buys a quantity of window glass listed at $500, on which he receives a discount of 80%, and a discount of 20% on the sum remaining after the first discount. What is the amount of the bill? What single discount is equal to a discount of 80%, and a further discount of 20% on the 20% remaining after the deduction of the first discount? Find the net price of plated ware listed at $360, with discounts of 33⅓ and 10%. What single discount is given when successive discounts of 30% and 10% are given. What single discount is equal to 10% and 30%?

SALES SHEET.

Salesman No.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Salesman's Weekly Total.
	9|50	5|25	1|23	4|56	7|89	3|21	
I	|75	6|40	6|54	5|43	2|10	7|50	
	1|25	2|34	10|00	6|50	7|35	2|25	
	3|69	1|69	9|40	3|05	6|25	3|75	
	8|54	9|23	6|70	1|29	6|45	9|24	
II	1|23	4|56	7|89	9|87	6|54	3|21	
	2|40	3|60	4|80	1|30	5|70	9|10	
	14|16	15|17	18|21	9|23	7|25	5|35	
	8|54	8|75	9|24	8|24	10|50	5|65	
III	9|22	9|22	3|67	9|35	1|23	1|25	
	8|21	5|67	1|23	1|67	3|67	3|36	
	7|65	4|53	|69	5|00	1|49	4|23	
	5|96	10|00	4|30	4|50	1|98	6|40	
IV	8|74	5|25	5|45	6|35	2|47	7|15	
	9|27	1|69	7|50	1|39	12|50	3|98	

Written—Pens bought at 40 cents a gross are sold at 2 for 1 cent. What is the per cent. of profit? Chairs listed at $2.40 are bought at discounts of 20% and 5%, and sold at 10% above their list price. What is the per cent. of profit? By selling a wagon for $90, a dealer made 25% profit. Find the cost. Bought gloves in Paris at 40 francs a dozen, paid a duty of $3 a dozen, and then sold them in Boston at $1.25 a pair. What was my net profit on 6 dozen pairs of gloves? What was the per cent. of net profit on the cost in Boston? Bought silk umbrellas in London at £5 a dozen, paid the duty of 50%, and sold them in New York at $4 each. What was my per cent. of

profit on the cost in New York? Bought leather pocket books in Germany at 1 mark each, paid the duty of 35%, and sold them at 50 cents each. What was the per cent. of profit on the cost in this country? 1 mark = $.238 cents.) Find the net cost of 280 pounds of rope, listed at 12½ cents a pound, with discounts at 20% and 5%. I bought goods listed at $750, discounts 20%, 10% and 5%. What was the net cost? Which is better and how much, for me to accept in buying a bill of goods listed at $300, a single discount of 45% or discounts of 35%, 10% and 5%?

The following invoices may also be given with discounts:

(1)	144 dozen eggs..	@ $0.12½	(2)	36 yds. calico....	@ $0.16⅔
	240 lbs. butter...	@ .25		25 " gingham	@ .20
	195 lbs. bacon...	@ .08⅓		27 " percale..	@ .12½
(3)	150 dozen buttons	@ $0.06¼	(4)	56 lbs. Rio coffee	@ $0.30
	24 " buttons	@ .03⅓		88½ lbs. Java coffee	@ .33⅓
	36 " buttons	@ .12½		66¼ lbs. Mocha coffee	@ .37½
(5)	120 lbs. coffee...	@ $0.30	(6)	60 lbs. tea.....	@ $0.62½
	1 pail, 20 lbs. spices	@ .33⅓		56 " coffee....	@ .37½
	2 drums, 60 lbs. pepper	@ .06¼		16 " cocoa....	@ .25
(7)	33¼ yds. muslin	@ $0.08⅓	(8)	124 lbs. dried peaches	@ $0.12½
	36½ " flannel	@ .25		116 lbs. sugar	@ .05
	36 " gingham	@ .25		80 dozen eggs	@ .16⅔
(9)	160 lbs. rice....	@ $0.08⅓	(10)	36½ lbs.	@ $0.16⅔
	144 cans corn...	@ .06⅔		18¼ "	@ .06¼
	257 lbs. starch..	@ .05		66 "	@ .33⅓
				180 "	@ .12½
				270 "	@ .08⅓
				27 "	@ .66⅔
				75 "	@ .18¾

Fifth Week.

Insurance, commission, taxes, sinking fund, poll tax, etc. Rapid addition and multiplication.

Drill—Rapid addition. (1) 17,357, 13,415, 12,665, 28,446, 13,457, 32,323, 23,433, 17,571, 18,132, 75,675, 53,153, 32,332, 43,433, 44,544, 10,101, 70,707, 55,666, 61,514, 13,344, 22,345. (2) 14,564, 18,657, 14,760, 36,461, 23,513, 45,543, 12,396, 51,771, 14,543, 44,344, 34,134, 44,244, 18,118, 31,476, 20,202, 80,808, 66,777, 13,121, 44,313, 33,456. (3) 11,877, 13,454, 24,079, 11,270, 11,818, 19,099, 56,891, 24,324, 16,561, 23,333, 14,144, 81,181, 27,127, 28,828, 30,303, 90,888, 77,817, 91,817, 31,133, 44,567.

Multiplication:

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
4	7	5	7	5	4	4	5	4	5	3	2	2	2	2

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
8	8	7	6	4	5	3	3	3	3	4	3	3	3	3

11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
9	9	6	4	6	6	5	4	5	4	5	4	4	4	4

13	14	15	16	17	18	19	21	22	23	24	25	26	27	28
4	5	7	3	6	2	2	6	5	5	6	6	3	3	3

Oral—Find the commission at ⅛% for selling 1,000 bushels of wheat at 80 cents per bushel? A man borrowed $10,000, through a broker, paying him 1% commission and $50 for expenses. (a) What was the broker's commission? (b) How much money did the borrower receive? A collector obtained 80% of the amount of his employer's bill of $250. He charged 4% commission. How much did his employer receive? What is the cost of insuring a vessel of $6,000 at 4½%? Find the cost of insuring grain worth $100,000 for ¾ of its value at 2% A house worth $3,000 is insured for 60% of its value at 1%, and the furniture is insured for $1,000 at 2%. Find the total cost of insuring. Find the taxes on property assessed at $8,000, the rate being ¾ of 1%. What rate does a man pay whose taxes are $75 per year on property assessed at $5,000. If the taxes at 1⅛% are $27, what is the assessed value of the property? Find the duty at 40% on paint brushes valued at $375. A piece of property was insured for $40,000 at 1¼%. After ten annual premiums had been paid the company paid a fire loss of $8,000. What was the net loss of the company on this property? A man invested $10,000 in business. The first year he lost 20% of his capital. The next year he gained 20% on what he had left. What was his net gain or loss?

Written—The tax rate in the city of New York in 1900 was 2.32113 per centum. Find the tax on property assessed for $7,500 at that rate. The assessed valuation of property in a village was $3,200,000. What tax rate was necessary to raise $16,800 by taxes? In a certain city the tax rate in 1908 was $1.43 on $10, and in 1909 it was 1.25 per cent. What was the difference in the tax to be paid by a man whose property was assessed each year for $3,000? Find the tax on $7,500 at 1½ per centum. The tax rate is 3 mills on a dollar. What must I pay in taxes, if I am assessed $3,000 for real estate and $2,500 for personal property? What tax will be paid by a man whose house is assessed for $5,200, personal property for $2,000 and who pays a poll tax of $1, the rate of taxation being 2½ mills on a dollar? My tax at 4 mills on a dollar was $24.60. What is my assessment? Find the premium for insuring a brick house for $4,800 at $2.50 per $1,000 for 3 years. What will it cost to insure my house, valued at $6,000, and my furniture, valued at $1,500, for ¾ of their value, the rate being $3.50 per $1,000 for 3 years?

(To be Continued.)

Meet All the City Requirements

GRADED EXERCISES IN ARITHMETIC

By MARIA JURY, Assistant to Principal, Public School No. 10, Boys, Manhattan; JEROME A. O'CONNELL, Member of Board of Examiners, Department of Education, New York City; and EDWARD B. SHALLOW, Associate Superintendent of Schools, New York City.

Fourth Year, 1st Half **Fourth Year, 2d Half**
Net Price, Each, 24 Cents

Fifth Year, 1st Half **Fifth Year, 2d Half** **Sixth Year, 1st Half**
Net Price, Each, 28 Cents

Sixth Year, 2d Half. Net Price, 32 Cents

These problem books supplement the regular textbooks in arithmetic, and meet the requirements of the Course of Study. Each book is divided into five parts, corresponding to the five months of the school term. Each part is subdivided into twenty exercises, made up of ten oral and ten written problems, which conform to the needs of that grade as set forth in the Syllabus. The work for each month is preceded by an outline of the topics to be studied, in which the new work is printed in full-faced type.

The problems are of a practical nature, dealing as far as possible with the experiences of everyday life, and quite within the child's comprehension. They are not complicated by the introduction of extraneous subjects which serve to distract the attention of the pupil from the arithmetical principles involved. They are intended to develop in the pupil accuracy and skill in the use of numbers rather than to instruct him in natural history, geography, or the sciences. These books will be found very practical for use in the grades.

The problems given in Miss Jury's article in this issue will show to some extent the very practical and helpful nature of these Arithmetics.

AMERICAN BOOK COMPANY

100 WASHINGTON SQUARE NEW YORK CITY

VOL. XV JUNE, 1913. NO. 2

New York Teachers Monographs

READ AND KEPT BY 50,000 TEACHERS.

EDITED BY

MARIE L. BAYER SIDNEY MARSDEN FUERST JAMES A. O'DONNELL

CONTENTS, JUNE, 1913

TESTS IN ARITHMETIC 1B-8B. By Maria Jury..... 1
ARITHMETIC TESTS 1A-8B. By Charles W. Morey..... 12
EFFICIENCY IN ARITHMETIC TEACHING. By John H. Walsh..... 22
SPEED CONTESTS. By Eva F. Buker..... 28
TESTS FOR SPEED IN ARITHMETIC. By E. L. Thorndike..... 33
TEACHING READING. By James L. Hughes..... 45
TEACHING TO READ EFFICIENTLY. By C. V. Campbell..... 53
GRADED EXERCISES IN DICTATION. By Ella K. Jelliffe..... 67
ORAL COMPOSITION 1A-3B. By Lydia A. Miller..... 95
SUGGESTIVE LETTERS 1A-8B. By L. G. Miller.....101
TESTS—6A and 8B.....117
ARITHMETIC 8A 121

Published March, June, October, December, by New York Teachers Monographs Co., 9 East 17th Street, New York City. One Dollar a year. Single Copies 30 cents.

Entered at Post Office, New York City, as second-class matter.
Copyrighted June, 1913, by the New York Teachers Monographs Co.

PUBLICATION OFFICE, NEW YORK TEACHERS MONOGRAPHS } 9 E. 17th St., N. Y. City

All letters should be addressed Box 47, Madison Square Post-office, New York City.

JUST ADOPTED FOR USE IN NEW YORK CITY SCHOOLS, 1913-1915

DURELL'S ARITHMETICS

Adequate—Practical—Efficient

1A-4B	7325	DURELL'S ARITHMETIC, Book One (For Teachers' Use)	.....	.40
3A-4B	7303	" " Book One, Part II	.....	.28
5A-5B	7304	" " Book Two, Part I	.....	.32
6A-6B	7305	" " Book Two, Part II	.....	.32
7A-8B	7306	" " Book Three	.....	.56

CHARLES E. MERRILL COMPANY

432 Fourth Avenue, New York

Publishers of School and College Textbooks

New York Teachers Monographs
PLANS AND DETAILS OF GRADE WORK
JUNE, 1913

Tests in Arithmetic—1B

By Maria Jury, Co-author of the Jury, Shallow & O'Connell Arithmetics.

Fundamental Operations.

(1) 3 + 7 + 6 + 4. (2) 27 + 21. (3) 15 + 10 + 12. (4) 37 — 15. (5) 78 — 31.

Mental.

(1) I have 2 dimes and 1 five-cent piece; how many cents in all have I? (2) I paid 3 cents for an orange, 5 cents for an apple and 2 cents for a pencil; how much in all did I spend? (3) How many shoes are required for two horses? (4) How much money has John in his bank if he has a dime, a five-cent piece and 3 pennies? (5) Robert has 4 chestnuts in each hand; how many chestnuts has he? (6) There are 2 apples on each of 2 plates; how many apples are there on both plates? (7) Start with 3 and count to 50. (8) There were 9 boys playing a game and 3 were called to dinner; how many boys were left? (9) James had 15 marbles and lost 7; how many had he then? (10) How much will I have to pay for 2 two-cent stamps?

Written.

(1) Jane is 17 years old and her brother is 5 years older; how old is her brother? (2) Frank had 25 marbles and won 17; how many has he now? (3) Clarence cut 3 feet of rope from a coil; how many inches were there in it? (4) John's little sister picked 2 quarts of currants; how many pints did she pick? (5) In one class room there are 25 boys and in another room there are 18 boys; how many boys are there in both rooms? (6) If you have $2, 6 dimes and 3 five-cent pieces, how many cents have you? (7) A young man that is now 18 years old, was how old 6 years ago? (8) There are 16 boys and 14 girls in the same class; how many more boys than girls are there? (9) Harry had a dime; he spent 3 cents for an apple and 2 cents for a cake; how much money had he left? (10) I spent 25 cents for oranges, 15 cents for apples and 10 cents for pears; how much change did I receive from a dollar bill?

2A

Fundamental Operations.

(1) 46 + 89 + 32 + 65. (2) 45 + 78 + 33 + 67. (3) 8 + 2 + 7 + 3 + 6 + 4. (4) 765 — 153. (5) 793 — 401.

Mental.

(1) How many quarters will make a dollar? How many halves will make a dollar? (2) Count by 5's to 50. (3) How much will 8 two-cent stamps cost? (4) I spent 15 cents for candy and 10 cents for ice cream; how much did I spend? (5) I had a dime, a nickel and 4 cents; how much money had I? (6) One-half a dime and 3 cents equals how many cents?

(7) A boy had a dollar and spent ¾ of a dollar; how much did he have left? (8) Henry counted 9 ducks in a pond; when 6 flew away, how many were left? (9) How many pints are there in 2 quarts and a pint?

Written.

(1) A conductor rang up 22 fares on one trip and 26 fares on another; how many fares did he ring up for both trips? (2) Draw a square and divide it into fourths and mark the fourths. (3) Mary has 47 roses and Jane has 25; how many roses have both of them? (4) A farmer buys 36 sheep from one farm, 27 from another and 54 from another; how many does he buy from the three farms? (5) How many pints are there in 4 quarts and 1 pint? (6) Mr. Howe had $86 in the bank and he drew out $25; how much money did he still have in the bank? (7) John has 427 marbles and Robert has 213; how many more marbles has John than Robert? (8) A man spends $45; he had $97 in his purse; how much had he left? (9) Write from dictation: 75, 440, 5, 444, 404, 400. (10) A dealer had 89 sheep and sold 54; how many sheep had he left?

2B

FUNDAMENTAL OPERATIONS.

(1) 88 + 76 + 97 + 39 + 45. (2) 493 + 40 + 291 + 19 + 333. (3) 77 + 24 + 89 +21 + 39. (4) 411 — 307. (5) 740 — 634.

Mental.

(1) Express in Roman numbers or in Arabic figures: IX, 11, 7, XII, 9. (2) Name these signs and tell for what each sign is used: =, —, +, $, c. (3) How many feet are there in a yard? How many minutes are there in an hour? (4) Count by 3's to 36, beginning with 4. (5) 3 + 4 + 5 + 6 — 7 = ? (6) Six feet are how many yards? (7) Six donkeys have how many ears? (8) A boy had 14 marbles; he lost 8; how many had he left? (9) How many cents are there in ¼ of a dollar, 2 dimes, 1 nickel and 4 cents? (10) How many shoes will 4 horses need?

Written.

(1) Write the following numbers: 901, 9, 90, 109, 619. (2) Find the amount of 128, 67, 199, 78, 67. (3) Jennie learned 23 lines of poetry a month for three months; how many lines did she learn altogether? (4) Mother bought a box of cocoa for 19 cents, a box of baking powder for 22 cents, two ounces of pepper for 5 cents, a bag of salt for 5 cents, and a bag of oatmeal for 28 cents; how much did she pay for all? (5) Write the Roman numbers for 10, 9, 12, 6, 3. (6) There were 25 children in one room, 36 in another, 48 in another and 54 in another; how many children were there in the 4 rooms? (7) A farmer picked 48 quarts of strawberries; he sold 35 quarts; how many quarts had he left? (8) Charles bought a wheel for $35 and sold it for $29; how much did he lose? (9) If you pay $1.12 for a yard of cloth, how much change will you receive if you give the storekeeper a fifty-cent piece and 3 twenty-five-cent pieces? (10) Mr. Graham paid $625 for a lot and sold it for $850; how much did he gain?

3A

FUNDAMENTAL OPERATIONS.

(1) \$689 + \$678 + \$745 + \$997 + \$674. (2) 3,001 — 2,099. (3) 489 × 8. (4) 824 ÷ 4. (5) 936 ÷ 6.

Mental.

(1) 4 + 8 + 5 — 4 — 3 × 2 = ? (2) There are 8 children sitting in a row; how many children are there in 6 rows? (3) How many apples are there in ¼ of a dozen? (4) How many pint bottles can be filled with 6 quarts of milk? (5) ⅕ of 25 = ? (6) A boy was on board a steamer 2 days; how many hours was he on board? (7) At 2 cents a pint, how much will 2 quarts of milk cost? (8) If oranges are 2 cents each, how much will 1 dozen cost? (9) Fred gave ¼ of his marbles to John; if he had 20, how many did he give away? (10) At 5 cents each, how much will 7 paper dolls cost?

Written.

(1) Ruth weighs 48 pounds and Edith weighs 45 pounds. How much do they both weigh? (2) George can throw a ball 36 yards and Paul can throw it 60 yards; how much farther can Paul throw the ball than George? (3) Three tables cost \$75; at that rate, how much will 1 table cost? (4) There are 35 bananas in a bunch; how many are there in 9 bunches? (5) Henry had \$16.44; Charles had \$4.63 more than Henry; how much money had Charles? (6) There are 376 pounds of tea in one box, and there are 5 boxes on the wagon; how much did the load weigh? (7) A storekeeper put \$87.09 in the bank the first day and \$62.93 the next day; how much more money did he put in the first day? How much did he put in the bank during the 2 days? (8) A factory turned out 4,080 suits in 4 days; how many suits were turned out in 1 day? (9) One box holds 9 books; how many boxes will I have to have to hold 279 books? (10) If there are 174 lines on 6 pages of a book, how many lines are there on 1 page? How many lines are there on 16 pages?

3B

FUNDAMENTAL OPERATIONS.

(1) \$893 + \$786 +\$968 + \$679 + \$567. (2) 9,010 — 993. (3) 987 × 69. (4) 6,483 × 246. (5) 65,114 ÷ 7.

Mental.

(1) Count by 9's, beginning with 0, to 100. (2) If 3 oranges cost 5 cents, how much will 9 cost? (3) If 3 bananas cost 10 cents, how many can I buy for 20 cents? (4) In a pasture I counted 48 horses' feet; how many horses were there in the pasture? (5) How many shoes do 41 boys wear? (6) I had 50 cents and spent all but 2 cents; with the money I spent I bought oranges at 4 cents each; how many oranges did I receive? (7) Ned has 24 marbles; Henry has ⅙ as many; how many has Henry? How many have both? (8) Mary had 1 hour before supper; she sewed for ¼ of an hour, studied for ¼ of an hour, and played until supper time; how long did she play? (9) How much will 3 chairs cost at \$1.50 apiece? (10)

James had $1; he spent 25 cents for a ball, 20 cents for a top and 15 cents for some candy; how much had he left?

Written.

(1) How many days are there in 24 weeks? (2) Draw an oblong; divide it into sixths; shade or darken 3 portions; what part is light; show ⅓; which is larger, ½ or 3/6 of the oblong? (3) A grocery bill was $97.03; how much was left after paying, if the man had $208? (4) At $15.50 apiece, how much will 48 suits of clothes cost? (5) I spent $15.06 for a dress, $9.08 for a hat, $1.25 for gloves, $4 for shoes, and $5.50 for a parasol; how much did I spend? How much change did I receive from 2 ten-dollar and 3 five-dollar bills? (6) A court is about 75 feet wide and 80 feet long; its area is how many square feet? (7) A man's salary is $900 a year; he saves ⅙ of it; how much does he save? How much does he spend? (8) If 9 bins hold 6,390 bushels of corn, how many bushels are there in each bin? (9) A ship sails 124 miles in a day; how many miles will that ship sail in a week? (10) Forty-one pieces of candy fill a box; how many boxes will 861 pieces of candy fill?

4A

FUNDAMENTAL OPERATIONS.

(1) 3,478 + 5,624 + 7,886 + 3,235 + 5,489 + 3,876. (2) 87,243 — 68,795. (3) 8,762 × 96. (4) 107,456 ÷ 12. (5) 37,245 ÷ 89.

Mental.

(1) Read as Arabic numbers: XII, IX, XV, DC, XLIX. (2) Add by 7's, beginning with 4, to 100; subtract by 6's, beginning with 100. (3) A farmer has 38 acres of corn, 10 acres of wheat and 19 acres of meadow; how many acres has he in all? (4) How much tape would it take to bind a piece of oilcloth 9 inches by 7 inches? (5) Find the cost of 2 dozen oranges at 1½ cents apiece. (6) What is the cost of 1 yard of cloth, if 16 yards cost 96 cents? (7) If 2 quarts of milk cost 12 cents, how much will 3 gallons cost? (8) By selling a horse for $300, I gain $40; how much did it cost me? (9) How many inches are there in ¾ of a yard? (10) Mary went to the grocer's and bought 3 loaves of bread at 5 cents a loaf, and 4 quarts of milk at 8 cents a quart; how much change should she receive from $1?

Written.

(1) Write as Roman numbers: 456, 872, 123, 58, 65. (2) I sold a quantity of grain for $1,053.75 and lost $84.30; how much should I have gained had I sold it for $1,300? (3) I paid $105 for cloth at $1.75 a yard; I sold it at a gain of $35; for how much per yard did I sell it? (4) A grocer bought 250 pounds of coffee for $82.50, and sold it at 37 cents a pound; how much did he gain? (5) I bought a house for $8,755.75; I spent ⅕ of that amount for repairs, and then sold the house at a gain of $205.75; for how much did I sell it? (6) If I buy 94 pounds of butter at $.28 a pound, and sell it for $28.20, how much do I gain or lose on a pound? (7) If a boy earns $3.75 a week selling papers, and $2.50 more for selling gro-

ceries, how much can he earn in 26 weeks? (8) If a train travels 16,443 miles in 29 days, how many miles does it travel in 1 day? (9) A man sold 1,080 acres of land at $255 an acre, and with the money bought horses at $75 each; how many horses did he get? (10) A man paid $22.50 for a harness, and 3 times as much for a wagon; how much did both cost?

4B

FUNDAMENTAL OPERATIONS.

(1) 4,863 + 6,497 + 7,654 + 1,234 +8,976 + 9,652 + 8,793 +7,456. (2) 675,052 — 384,987. (3) 4,867 × 268. (4) 64,583 ÷ 12. (5) 354,672 ÷ 289.

Mental.

(1) James paid 15 cents for his lunch, 10 cents for carfare, and had 25 cents left; how much money had he at first? (2) If you sell something for 66 dollars and gain 16 dollars, how much did it cost you? (3) How many minutes are there in 12 hours? (4) A boy paid $5.75 for a coat and a pair of shoes; for the shoes he paid $2.22; how much did he pay for the coat? (5) New York is 140 miles from Albany; if a man travels this distance 6 times, how many miles does he travel? (6) When 96 cents will buy 4 dozen eggs, what is the price of 3 dozen? (7) A piece of work can be done by 21 men in 7 days; how long will it take 15 men to do the same work? (8) My coat cost me 3/9 of 63 dollars; how much did I pay for it? (9) I spent 5/6 and 1/12 of my money, and gave away 1/24; how much remained? (10) One third of a pole was broken off by the wind, 1/8 of it was in the mud, and the remainder was in the air; what part of it was in the air?

Written.

(1) A farmer owns 87 5/16 acres of land; his wife owns 42¾ acres, and his son 29⅝ acres; how many acres do they own together? (2) Mr. Taylor has a bin that will hold 120 bushels of corn; he put in 16 5/9 bushels, 35⅚ bushels, and 57 11/18 bushels; after selling 156 pecks out of what he put in, how much more corn could he then put into the bin? (3) A clerk has a yearly salary of $1,000; he pays $312 for board, $157.50 for clothing, and $372.25 for all other expenses; how much does he save in a year? (4) How much change should I get from a $5 bill, if I buy 3 gallons, 1 quart of molasses at 48 cents a gallon? (5) How much will 27 pecks of blackberries cost at 18 cents a quart? (6) How much will ¾ of a yard of lace cost, if 2 yards cost $4.48? (7) A room is 25 feet long and 15 feet wide; find the area of both ceiling and floor. (8) A room is 27 feet long and 18 feet wide; how much will it cost to paint the ceiling at 25 cents a square yard? (9) If a boy lives 25¼ rods from school, how far does he walk in a week to attend two sessions a day? (10) A lady bought a tract of land for $5,000 and sold ⅗ of it to Mr. Jones and ¾ of the remainder to Mr. Allen; what was the cost of what remained?

5A

FUNDAMENTAL OPERATIONS.

(1) 58,764 + 83,452 + 67,658 + 34,721 + 38,056 + 42,008. (2)

67,003 — 49,878. (3) 4,567 × 289. (4) 876,452 ÷ 9. (5) 345,678 ÷ 248.

Mental.

(1) If I spend ½ of $50, and then ⅗ of the remainder, how much shall I have left? (2) Robert had 27 marbles and William 2⅓ times as many; how many had William? (3) If 4 dictionaries cost $36, how much will a dozen cost? (4) Name two factors of 35; of 27; of 26. (5) Name four fractions that can be reduced to 48ths. (6) What is the difference between ½ of a dollar and ½ of a dime? (7) At 5 cents a foot, how much will it cost to put picture molding around a room 21 feet long and 15 feet wide? (8) How many cubic feet are there in a box 5 feet long, 3 feet wide, and 3 feet deep? (9) A pole stands so that ⅓ of it is in the mud and ⅙ of it is in the water; what part of the pole is above the water? (10) ⅞ of 56 equals how many fourths of 28?

Written.

(1) Mr. C. Jones buys of Frankfield & Co., jewelers, 48 hat pins at $.25 each, 24 rings at $3.75 each, 15 silver rings at 3 for $1, 75 nut picks at $.80 a hundred; make out a bill in proper form and receipt it. (2) On Monday the tide rose ⅝ foot the first hour, 1/12 foot the second hour, and ¾ foot the third hour; how much was the rise in the three hours? (3) I have a strip of cloth 75¾ inches long; I use all but 9⅛ inches; how many inches do I use? (4) A farmer bought a horse for $250; he kept it at an expense of $75 and then sold it for $385; how much did he gain? (5) Multiply 5,600 by 320. (6) I bought 350 books for $525, and sold them so as to gain ⅗ of the cost; for how much apiece did I sell them? (7) If from a piece of cloth 105¼ yards, 17⅔ yards were cut, how many yards remained? (8) How much will it cost to slate the walls for 9 blackboards, at 40 cents a square yard, each being 27 feet by 3 feet? (9) What is the cost of fencing a field 80 rods long and 70 rods wide, at $1.80 a rod? (10) How many cubic yards are removed in digging a cellar 50 feet long, 27 feet wide and 28 feet deep?

5B

FUNDAMENTAL OPERATIONS.

(1) 78,438 + 29,467 + 81,643 + 32,872 + 87,324 + 45,756 + 38,219 + 62,871. (2) 625,873 — 487,629. (3) 4,582 × 870. (4) 246,783 ÷ 120. (5) 187,642 ÷ 246.

Mental.

(1) If 4 yards of muslin cost 48 cents, how much will ¾ yard cost? (2) A grocer pays 36 cents a pound for tea and sells it for 45 cents a pound; what part of the cost is gain? (3) If 600 oranges cost $3.60, how much will 25 oranges cost? (4) Jane having ⅘ yard of silk, gave ¾ of it to her sister; what part of a yard did she give away? What part of a yard had she left? (5) A. can do a piece of work in 2 days, and B. in 3 days; if they both work together, how long will it take them to do it? (6) If a person's expenses are $12 a week, how much will they be for 9¾ weeks? (7) What is .37½ of $800? (8) Divide .8 by 2,000. (9) What decimal part of ⅝

is ¼? (10) If a gross of pens costs 72 cents, how much apiece must I sell the pens so as neither to gain nor lose?

Written.

(1) I had $10,720. I invested .25 of it in land, and .12½ of the remainder in fencing the land; how much of the money remained? (2) What is the area of a square field, the perimeter of which is 500 rods? (Make a diagram.) (3) 87.5 × (500 ÷ .25) = ? (4) From 6.5⅔ take 3.005⅕. (5) Divide .24 by 6,000; divide 24 by .006. (6) How much will 14¼ yards of cloth cost, if 36.48 yards cost $54.72? (7) How much will 11,750 feet of pine board cost at $55 per M.? (8) Simplify $\frac{\frac{3}{4} \text{ of } 3\frac{1}{5} \text{ of } 15}{7\ 1/7 \times 4\frac{1}{5} \times \frac{2}{5}}$ (9) Mr. Robinson paid $5,250 for a house, which was 3/7 of the value of all his property; what was the value of the property? (10) Multiply 3.1416 by 1,000, and divide the product by 100.

6A

FUNDAMENTAL OPERATIONS.

(1) 56,789 + 84,321 + 57,458 + 23,842 + 68,753 + 78,964 + 32,146 + 54,879. (2) 870,002 — 389,917. (3) 8,769 × 687. (4) 367,452 ÷ 120. (5) 248,756 ÷ 648.

Mental.

(1) How much will 3 gallons of milk cost at 8 cents a quart? (2) Jane paid $2½ for a dress, $1¾ for a pair of shoes, and $½ for some ribbon; find the cost of all. (3) Mr. Brown gave $70 for a watch and 3/7 as much for a chain, and sold them both for $90; how much did he lose? (4) A man having 40 sheep, lost 20 and found only ⅗ of the number he lost; how many sheep had he then? (5) If 4 apples cost 7 cents, how many apples can be bought for $.35? (6) How much will $20,000 worth of real estate be taxed at $1.70 per M.? (7) At $2 per 1,000 feet, find the cost of 3,125 feet of lumber. (8) How many feet are there in 6 yards 2 feet? (9) How many minutes are you in school if you arrive at 20 minutes of 9 o'clock and remain till noon? (10) A principal of a school is allowed $200 for repairs; he spends only 40% of it; how much does he save for the city?

Written.

(1) A man bought 4 pieces of cloth; the first contained 37⅝ yards; the second, 41⅚ yards; the third, 27¾ yards; the fourth, 38⅜ yards; how many yards in all did he buy? (2) Reduce 9/1600 to a decimal. (3) What was the exact number of days from April 16, 1911, to November 21, 1911? (4) A note dated January 31, 1908, was paid June 30, 1912; how long did it run? (5) In ⅝ of a mile of subway, how many rods, yards, feet and inches are there? (6) Multiply .625 by 25 hundred thousandths and divide the product by 125 thousandths. (7) How much will it cost to dig a cellar 30 feet long, 28 feet wide and 6 feet deep, at 35 cents a load (27 cubic feet)? (8) I bought 8 bushels of chestnuts at $6.25 a bushel, and sold them at 8 cents a pint; how much did I gain? (9) A merchant bought 64 barrels of

flour for $384 and sold it at a gain of 37½%; for how much per barrel did he sell it? (10) A man bequeathed to his wife $4,860, which was 12/35 of his estate; what was the value of the estate?

6B

Fundamental Operations.

(1) 46,783 + 58,762 + 97,873 + 45,687 + 65,432 + 89,898 + 47,876 + 83,478, or $875.56 + $600.87 + $584.92 + $548.10 + $88.43 + $654.85 + $7.56 + $95.08. (2) 870,354 — 689,487. (3) 4,897 × 689. (4) 98,456 ÷ 120. (5) 102,786 ÷ 694.

Mental.

(1) Robert gave $¼ for a circus ticket, $⅘ for a straw hat, and had $1/10 remaining; how much had he at first? (2) A grocer sold 5 pecks, 3 quarts of peaches to a customer at 15 cents a quart; how much did he receive for them? (3) How much will 600 eggs cost at 37½ cents a dozen? (4) If it took 4 ten-yard rolls of ribbon for the diplomas of the graduating class, and 12 inches was used for each diploma, how many graduates were there? (5) If I buy chickens at the rate of 4 for $3 and sell them at the rate of 8 for $7, how much do I gain on 40 chickens? (6) When gas costs 80 cents a thousand cubic feet, how much will 1,250 cubic feet of gas cost? (7) What per cent. of 3 gallons is 6 pints? (8) A grocer lost 10% by selling butter 4 cents per pound less than cost; find the cost. (9) A grocer sells 10 pounds of butter for what 8 pounds cost him; what per cent. did he lose? (10) What is the interest of $30 for 2 years, 6 months at 6%?

Written.

(1) 15/16 of 83⅓ is what part of 62½ × 1⅞? (2) A real estate broker bought 25 acres of land; he kept ⅜ of it, used 1/10 of it to make a street, and divided the rest into lots, each containing ⅝ of an acre; how many lots were there? (3) A mercant pays $10,050 for a stock of goods; he sells them at an advance of 33⅓%; the expenses connected with the business are $1,750; what is his net gain? (4) A merchant bought 750 yards of carpet, paying $1.75 a yard; his commission was 2¼% for buying, ¼% commission for a draft, and $12.50 for freight; amount of his bill? (5) A commission merchant sold 62 lawn mowers at $20 each, and 18 at $15 each; if, after deducting his commissions, he remitted $1,057 to the manufacturer, what was the per cent. of commission? (6) An agent received $210 for making a sale of goods at 3½%; what was the amount of the sale and the net proceeds? (7) Mr. John Tompkins bought goods amounting to $360.75 from Mr. Henry Clay; write a receipt; write a check for the amount. (8) From the key word "Charleston" find the cost mark and the selling price of ties bought for $4.20 a dozen and sold to gain 20%. (9) Write the cash account of Robert Brown: Receipts: Jan. 1, 1913, cash on hand, $1.52; Jan. 4, monthly allowance, $5; Jan. 27, birthday present, $10. Amounts paid out: Jan. 2, flowers, $1.25; Jan. 7, book, $1.13; Jan. 16, fruit, $.65; Jan. 27, theater, $.75. (10) What is the interest at 5% on a note for $5,000 from Jan. 12, 1907, to Dec. 12, 1912?

7A

FUNDAMENTAL OPERATIONS.

Use those of fifth or sixth years.

Mental.

(1) A farmer sold ⅓ of his corn to one man, ⅙ to another, and had 50 bushels remaining; how many bushels had he at first? (2) What is the difference between 25% of $400 and ¼% of $400? (3) A farmer sold 224 bushels of wheat at $1.25 a bushel. How much did he receive for it? (4) How much will a man pay who owns property valued at $3,000, when the rate of taxation is 5 cents on $100? (5) Define List Price, Discount, Net Price. (6) The list price of a piano is $400; the merchant allows a discount of 4%. What is the net price? (7) Define Interest, Principal; name the terms in percentage that correspond to the terms in interest; what is the added element in interest? What is amount? (8) Find the interest and amount of $250 for 2 years, 6 months, at 6%. (9) A man sold his wheel for $75 at a loss of $15; what per cent. did he lose? (10) A dealer sold a machine for $60, which was 33⅓% more than it cost him; how much did it cost him?

Written.

(1) Of a farm containing 697 17/32 acres, 256⅝ acres were in wheat, 297¾ acres in grass, and the remainder in corn; how many acres were in corn? (2) Multiply .048 by .016 and divide the product by .0004. (3) What per cent. is gained by buying syrup at 80 cents a gallon and selling it at 12 cents a pint? (4) A man's income is $5,500 a year; he pays 15% of it for rent, 20% of it for household expenses; how much money does he save? (5) The rate of taxation in a certain town is 7½ mills on the dollar; how much is a man's tax whose property is worth $8,700? (6) An American took with him to Europe a letter of credit for $954.60; he drew £35 in England, 1,500 francs in France, 650 lire in Italy, 250 marks in Germany, and 500 rubles in Russia; how much was left of his letter of credit? (7) An agent sold 2 houses for $4,800 each; on one he gained 14 2/7%, and on the other he lost 14 2/7%; how much was his entire gain or loss? (8) Find the amount of $720 from November 18, 1911, to April 13, 1912, at 6%. (9) How shall I mark goods that cost $3.60 a yard, in order that I may deduct 14 2/7% from the marked price and still gain 20%? (10) How much will 15 meters of silk cost at $4 per yard?

7B

FUNDAMENTAL OPERATIONS.

Use those of fifth or sixth years.

Mental.

(1) Find the cost of 4 yards, if ¾ yard costs 15 cents. (2) What decimal part of a ton is 800 pounds? (3) If 37½% of a field is worth $300, how much is 87½% of it worth? (4) Reduce 17/20 to a decimal fraction. (5) After paying 30% of his debts, a merchant finds that $210 will pay the remainder; how much does he save? (6) I sold a table for $72 and gained

20%; if 10% had been lost, what would have been my selling price? (7) A field is 40 rods square; how many acres does it contain? (8) What is the amount of $400 for 2 years, 6 months, at 6%? (9) By running 15% faster than usual, a locomotive runs 690 miles a day; what is the usual distance it runs? (10) A dealer sold a piano for $450 and lost 28 4/7%; what was the cost?

Written.

(1) Define Ad Valorem Duty; Specific Duty. (2) Find the duty on 400 boxes of raisins valued at $1.50 a box, each containing 36 pounds, if the rate is 1 cent a pound and 35% ad valorem. (3) What is a Promissory Note? Give essential parts of a promissory note. Define Date of Maturity; Term of Discount. (4) (a) Write a promissory note for $500 dated September 7, 1910, due in 8 months and bearing interest at 8%. (b) Find the bank discount and proceeds of this note if it is discounted February 10, 1911. (5) A man sold a sleigh for $12 and lost 33⅓%; if he had sold it at a profit of 25%, how much would he have received for it? (6) What is the net price of a bill of goods for $1,250 on which discounts of 20%, 10%, and 5% are allowed? (7) A farm rectangular in form is 75 rods wide and 96 rods long; what is its value at $66 an acre? (8) The wheel of a machine has a radius of 3½ meters; what is the circumference of the wheel in inches? (9) A triangular farm contains 6 acres; it is 43 rods long; how wide is it? (10) In a battle 22% of an army was killed, 18% was wounded and 12% were taken prisoners; if 984 men escaped, how many men were there in the army at first?

8A

FUNDAMENTAL OPERATIONS.

Use those given for the fifth or sixth year.

Mental.

(1) I purchased 2 bushels of apples at $1.20 per bushel and sold them at 45 cents a peck; how much did I gain on a bushel? (2) This month my gas bill is 2/7 larger than it was last month; this month I paid $3.60; how much did I pay last month? (3) I bought 12 dozen buckles at 25 cents a dozen; how shall I mark them a dozen to make 33⅓%? (4) A boy cut 9 inches from his mother's yard stick; what per cent. of it remained? (5) I bought coal at $5 a ton and sold it for $6.25 a ton; what per cent. did I gain? (6) What is the second power of 7? (7) If ⅜ of a yard of velvet costs $9/10, how much will 14 yards cost? (8) What is the interest of $500 for 1 year, 9 months, at 4%? (9) An agent sold a lot for me for $2,400. How much commission does he receive at 1½%? (10) Multiply 189 by 33⅓ (short method).

Written.

(1) Raise 79 to the second power. (2) A man deposited $700 in the savings bank; if he left his money there without withdrawing any of it, how much would he have in the bank at the end of 1 year, 6 months, if the bank paid interest at 4% semi-annually? (3) What are the proceeds of a note for $900, dated November 29, 1912, payable in 90 days, if discounted De-

cember 15, at 6%? (4) At $1.20 a yard, how much will it cost to carpet a room 17 x 15 feet with carper ¾ yard wide? (5) How many bushels are there in a bin 24 feet long, 15 feet wide, and 7 feet deep? (6) How many gallons of water are there in a swimming pool 60 feet long, 21 feet wide, with an average depth of 5½ feet? (7) If 2½ yards cost $6¼, how many yards can be bought for $8¼? (8) Solve: $\frac{2x}{3} - 16 = \frac{x}{6} + 1$. (9) A rug 8¼ feet by 10½ feet is placed on the floor of a room which is 14 feet 6 inches by 12 feet; find the area of the uncovered part. (10) Change 421⅜, 909 7/20, and 735 11/16 to decimals and find their sum.

8B

FUNDAMENTAL OPERATIONS.

Use those given for the fifth or sixth year.

Mental.

(1) Eighteen days board at $3½ per week will cost how many dollars? (2) How much will 5 bushels of potatoes cost at 25 cents a peck? (3) If 6 men can dig a ditch in 4 days, in how many days can 8 men dig it? (4) A well 36 feet deep is 4/9 filled; how long a rope will reach from the top of the well to the water? (5) Coal retails at $8 a ton; I can buy a carload at a discount of 10%. How much will I save, if there are 20 tons in a carload? (6) I sold a barrel of flour for $7.50 which cost me $6; what was my gain per cent.? (7) An agent sold 50 barrels of flour at $6 a barrel and received 3½% commission; what was his commission? (8) What is the amount of $400 for 2 years, 6 months, at 5%? (9) Find the area of a triangle whose base is 18 feet and altitude 10 feet. (10) The perimeter of a square is 884 feet; how long is one side?

Written.

(1) A man drew 3/7 of his money at one time and ¼ of the remainder at another; he then found that he had $90 left; how much money had he in the bank at first? (2) If 3½ yards of ribbon cost $5¼, how many yards can I buy for $8¼? (3) (a) Multiply .048 by .24 and divide the product by .016; (b) Reduce 2/125 to a decimal fraction. (4) The list price of a book is $1.75; discounts of 40% and 10% are given; what is the net price of a dozen? (5) How much is due July 6, 1912, on a note for $720 given October 20, 1911, with interest at 5%? (6) A rectangular tank is 15 feet long, 8 fet wide and 5 feet high; how many gallons will it contain? (7) A horse is tied to a stake by a rope 33 feet long; over how many acres can he graze? (8) (a) The area of a square field is 40 acres; what is its perimeter? (b) A rectangle is 128 inches long and 32 inches wide; what is the length of the side of the square containing the same amount of surface? (9) How much is due May 4, 1913, on a note for $1,200, dated April 4, 1912, with the following endorsements: August 4, 1912, $224; February 4, 1912, $730? (10) What are the proceeds of a note for $750, dated February 17, 1906, due in 60 days and discounted March 1, 1906, at 6%?

Tests in Arithmetic

Prepared by Charles W. Morey, Author of Morey's Arithmetics.

Note.—All problems—both oral and written—in the following tests are taken from the Morey texts.

Grade—1A

Fundamental Work.

Oral—(1) Read: 7; 20; 27; 45; 66. (2) 0 + 0; 0 + 3; 3 + 1; 1 + 5; 6 + 1. (3) What number comes just after 9 in counting? (4) What number comes just before 20 in counting? (5) Count by 10's from 50 to 100.

Written—(6) Copy these numbers: 3, 4, 5; 4, 5, 3; 5, 4, 3. (7) Copy these numbers: 25; 56; 40; 97; 79. (8) Add: 1 + 5; 6 + 1; 8 + 1; 1 + 7; 1 + 9. (9) 5 + 1 + 1 = ? 1 + 7 + 1 = ? 1 + 8 + 1 = ? (10) Add: 43 + 11; 54 + 11; 75 + 11; 11 + 67; 60 + 10.

Oral Problems.

(1) 6 men + 2 men = ? (2) Mary paid 5 cents for a block of paper and 2 cents for a pencil. What did she pay for both? (3) Henry had 6 cents in his bank. His father gave him 1 cent more. How many cents did he then have? (4) I saw 3 children on one double-runner and 2 on another. How many children did I see on both? (5) A hat cost $4 and a pair of shoes $2. Both together cost —— ?

Grade—1B

Fundamental Work.

Oral—(1) Read: 19; 37; 48; 75; 90. (2) 0 + 2; 3 + 2; 5 + 3; 8 + 2; 10 + 2. (3) 5 — 1; 7 — 1; 9— 1; 6 — 1; 10 — 1. (4) 3 + 1 + 2; 5 + 2 + 2. (5) Count by 5's from 25 to 50.

Written—(6) Copy these numbers: 3, 4, 7, 6, 5; 7, 5, 4, 6, 3; 5, 3, 4, 7, 6. (7) Write from dictation: 54; 67; 75; 49; 34. (8) Add: 41 + 18; 46 + 23; 75 + 22; 57 + 32; 22 + 20. (9) Subtract: 67 — 11; 56 — 31; 38 — 18; 78 — 10; 39 — 11. (10) 6 + 2 — 1 + 2 — 3 = ?

Oral Problems.

(1) Harry had six doves and bought two more. How many had he then? (2) Philip had six doves and sold two. How many had he left? (3) The class had 10 words in spelling. John misspelled two. How many did he spell correctly? (4) Mrs. Jones's hens laid 7 eggs on Monday and 3 on Tuesday. How many did they lay in both days? (5) What 2 coins make a dime? What 10 make a dime?

Grade 2A

Fundamental Work.

Oral—(1) Read: 79; 200; 340; 607; 479. (2) 6 + 4; 7 + 6; 9 + 3; 8 + 7; 4 + 8. (3) 9 — 5; 12 — 4; 16 — 8; 11 — 7; 20 — 5. (4) Count by 3's from 15 to 30. (5) Count by 4's from 24 to 40.

Written—(6) Copy: 0, 3, 4, 2, 1; 9, 6, 7, 8, 5; 2, 4, 6, 8, 0, 7, 3, 1, 9, 5. (7) Write from dictation: 59; 80; 109; 290; 587. (8) Add: 81 + 25 + 13; 220 + 350 + 410; 346 + 802 + 251; 204 + 503 + 302; 321 + 465 +

213. (9) Subtract: 87 — 25; 850 — 320; 488 — 106; 608 — 305; 987 — 653. (10) $3+2+4-2-3+5=?$

Oral Problems.

(1) A bat and a ball cost 18 cents. The bat cost 10 cents. What did the ball cost? (2) In one pasture there are 4 cows and in another 7 cows. How many in both pastures? (3) What 5 coins make a quarter dollar? Name 3 coins that make a quarter dollar. (4) How many times must you fill the pint measure to make a quart? A pint is what part of a quart? (5) When milk is 8 cents a quart, what will a pint cost?

Grade—2B

FUNDAMENTAL WORK.

Oral—(1) Read: 427; 800; 530; 961; 707. (2) Read: I; IV; VI; X; XI. (3) $7+9$; $8+6$; $9+4$; $9+?=15$; $?+7=13$. (4) $15-6$; $30-7$; $42-6$; $35-8$; $61-4$. (5) Count by 3's from 54 to 75.

Written—(6) Copy: 2, 5, 8, 1, 4, 7, 0, 3, 6, 9; 9, 5, 1, 7, 3, 0, 2, 6, 4, 8. (7) Write from dictation: 137; 748; 600; 520; 902. (8) Add: 341 + 526 + 102; 250 + 340 + 110; 325 + 657 + 101; 487 + 516 + 843; 190 + 360 + 950. (9) Subtract: 87 — 35; 92 — 47; 628 — 438; 417 — 109; 835 — 526. (10) $8+6-3+5-8+2=?$

Oral Problems.

(1) Fanny has 4 schoolbooks and 9 storybooks. How many books has she in all? (2) Louise had 15 cents. She spent 5 cents for a pin. How much had she left? (3) There were 13 trees on a street. How many were left after 7 were cut down? (4) In Dorothy's schoolroom there are 8 rows of seats and in Susie's there are 7 rows. In both rooms there are —— rows of seats. (5) How many inches in ½ of a foot? In ¼ of a foot?

Grade—3A

FUNDAMENTAL WORK.

Oral—(1) Read: 238; 406; 1,275; 1,666; 2,800. (2) What is the product of 6 and 7? What is the sum of 6 and 7? (3) $6\times ?=48$. $?\times 7=21$. $4\times 8=?$ $6\times 9=?$ $83-7=?$ (4) ½ of 16; ⅓ of 27; ⅕ of 30; ¼ of 28; ⅙ of 54. (5) $15+5\div 5+8\div 4+5\div 2-3=?$

Written—(6) Write in figures: Four thousand fifty-six. (7) Add: 148 + 57 + 364 + 29 + 650. (8) Subtract 365 from 839. (9) Multiply 262 by 4. (10) Divide 684 by 3.

Oral Problems.

(1) I have 5 apples in one basket and 7 in another basket. In both baskets there are —— apples. (2) There were 13 sheets of paper in a box. Ellen used 4 of them. How many were left? (3) Eight boys have each a speller, a reader, and an arithmetic. How many books in all? (4) How long will it take to save a quarter if you save a nickel a day? (5) How many ounces in half a pound?

Written Problems.

(1) Jennie pays 19 cents for a doll, 7 cents for cloth, 8 cents for thread, and 5 cents for a paper of needles. What does she pay for all? (2) A farmer raised 58 bushels of corn, and kept 16 bushels for his own use. How many bushels did he sell? (3) If one desk costs $24, what will 5 cost? What will 25 cost? (4) There are 576 barrels of flour in 4 cars. How many barrels to a car? (5) At 24 cents a dozen, what will half a dozen lemons cost? What will 2 dozen cost?

Grade—3B

FUNDAMENTAL WORK.

Oral—(1) Read: 605; 2,036; 7,502; 8,000; 6,250. (2) $47 + 5$; $47 + 35$; $65 - 7$; 8×7; $42 \div 6$. (3) $\frac{2}{3}$ of 24; $\frac{3}{4}$ of 20; $\frac{2}{3}$ of 36; $\frac{3}{4}$ of 36. (4) $6 \times ? = 48$. $? \times 8 = 32$. What two factors make 28? 54? (5) $9 \times 7 - 3 \div 6 + 5 - 3 \times 4 + 6 \div 9 - 3 = ?$

Written—(6) Write in figures: Seven thousand three hundred sixty. (7) Add: 1,263, 2,765, 48, 455, 2,267. (8) 5,283 — 2,607. (9) 5,852 ÷ 7. (10) 364 × 36.

Oral Problems.

(1) On Tuesday there were 37 pupils present and 6 absent. How many pupils belong to the school? (2) If you had a quarter dollar to pay for a 5-cent thimble and two 8-cent spools of silk, what change ought you to receive? (3) The uniforms for a baseball nine cost $54. What did each uniform cost? (4) In the month of February there are 28 days. How many weeks is this? (5) Herbert has 9 postage stamps, and William has 3 times as many and 7 more. How many has William?

Written Problems.

(1) In one lot of flour there were 148 barrels, in a second lot 219 barrels, and 167 barrels in a third lot. How many barrels in the three lots? (2) A man earned $538 and spent $359. How much had he left? (3) Forty-eight cents a bushel is —— cents a peck, and —— cents a quart? (4) Two hundred sixteen packages of cereal were shipped in 9 boxes. How many packages to a box? (5) A grocer bought 56 tubs of butter, each containing 35 pounds. How many pounds did he buy?

Grade—4A

FUNDAMENTAL WORK.

Oral—(1) $38 + 49$; $73 - 47$; 9×12; $? \times 7 = 63$. (2) $60 \div 7$; $\frac{5}{8}$ of 40; 27×100; $\$3.46 \times 10$. (3) Separate 56 into two factors; 36 into two equal factors. (4) One mile = —— feet. Three-fourths of a pounds is —— ounces. (5) $9 - 6 \times 9 - 2 \div 5 \times 7 + 5 \div 4 \div 2 - 5 = ?$

Written—(6) Write in figures: Thirteen thousand four hundred eight; XLV. (7) Write in words: 58,067. (8) Add: 38,659, 7,862, 6,930, 27,478, 3,949, 17,653. (9) 623.46×57. (10) 2,853 — 927.

Oral Problems.

(1) Martin has 25 marbles and his brother 15. How many has each after Martin gives 8 to his brother? (2) Each of Mary's three brothers gives her 10 cents. How many 5-cent dolls can she buy? (3) Louise buys three 5-cent boxes of crackers and two 2-cent postage stamps. What change does she get from a quarter dollar? (4) A farmer had 28 sheep. After selling ¾ of them, how many had he left? (5) Mrs. Mills paid $12 for materials for a dress, and paid the dressmaker $2 a day for 4 days. What did the dress cost?

Written Problems.

(1) In one week a man traveled 74 miles, 29 miles, 104 miles, 88 miles, 35 miles, and 67 miles. How many miles in all? (2) Mr. Dean raised 85 bushels of corn in one year and 57 bushels more the second year. How many bushels did he raise in both years? (3) A house rents for $12.75 a month. How much does the owner receive in a year? (4) A bushel of oats weighs 32 pounds. How many bushels are there in a load of 1,440 pounds? (5) Bread flour is $7.75 a barrel and pastry flour $7.40 a barrel. Mrs. Wentworth buys a barrel of bread flour and half a barrel of pastry flour. How much will the grocer return from two $10 bills?

Grade—4B

FUNDAMENTAL WORK.

Oral—(1) $65 + 49$; $73 - 58$; 6×9; $12 \times ? = 84$. (2) $720 \div 60$; $79 \div 6$; ⅜ of 72; 5/12 of 72. (3) Separate 63 into two factors; 64 into two equal factors. (4) ⅔ of a sq. yd. = —— sq. ft.; ⅔ of a cu. yd. = —— cu. ft. (5) $9 \times 7 - 3 \div 6 \times 2 \div 4 \times 7 + 7 \div 6 + 9 - 7 = ?$

Written—(6) Write in words: 870,025; write in Roman numerals the proper heading for the 54th chapter of a book. (7) Add: 347,295, 605,300, 79,684, 8,749, 56, 23,598, 178,085. (8) $520.64 — $196.28. (9) $34.76 $\times$ 407. (10) $719.46 $\div$ 54.

Oral Problems.

(1) At 3 cents an ounce, what will a quarter of a pound of cucumber seed cost? (2) A farmer bought a cow for $63 and a pig for 1/7 as much. How many dollars for both? (3) Eight hats cost $32. What will 5 cost? (4) Mrs. Grant made a rug 6 feet long and 3 feet wide. (a) How many square feet will it cover? (b) She bound the edge with tape for which she paid 6 cents a yard. What did the tape cost? (5) How many cubic feet in a cake of ice 3 feet long, 2 feet wide, and 2 feet thick?

Written Problems.

(1) A postman delivers 175 letters, 15 magazines, and 18 packages in the morning, and 98 letters, 7 magazines, and 19 packages in the afternoon. How many pieces of mail in all? (2) It took 162 tons of coal to run an engine for a year. The next year it took 8/9 as much. How many tons the second year? (3) Laura gains 97 credits in geography, 98 credits in spelling, 85 credits in arithmetic, and 75 credits in language. What is

her average mark? (4) Twelve trees were set out on the school grounds. Each tree cost $0.85, planting each tree $0.27, and wire netting for each $0.40. How much was paid out for all? (5) A room is 18 feet long and 15 feet wide. What will it cost to paint the floor at 15 cents a square yard? At 2 cents a foot what will the picture molding cost?

Grade—5A

FUNDAMENTAL WORK.

Oral—(1) 74 + 48; 74 — 48; 12 × 11; ? × 9 = 108; 144 ÷ 8. (2) 5/9 of 54 = ? 24 is what part of 30? 30 is 5/6 of what number? (3) Change to 12ths: 1; 2/3; 3/4; 5/6; 3 5/12; 3 14/24. Change to lowest terms: 12/16; 21/28; 18/30; 32/8; 2 16/24. (4) 2¼ + 2⅝; 3½ — 1¾; ¾ × 8/9; 3½ × 5/7; 8 × 4/5. (5) 32 ÷ 4 + 7 ÷ 5 × 8 + 4 ÷ 7 × 16 — 4 ÷ 6 = ?

Written—(6) Write in figures: three million twenty-eight thousand fifty-seven. Write in Roman numerals: 1,620. (7) Add: $3,784.97, $476.30, $16,708.39, $5,837.21, $0.54, $107.00, $69.88, $3.75. (8) 34,857 × 368. (9) $3,476.98 ÷ 86. (10) $\frac{12 \times 15 \times 24}{20 \times 4 \times 18} = ?$

Oral Problems.

(1) John had 50 cents. He lost 8 cents, and spent the rest for firecrackers at 6 cents a bunch. How many bunches did he buy? (2) Eight bars of soap weigh 36 pounds. What do two bars weigh? (3) Miriam's spelling book cost 1/5 of a dollar and her arithmetic ½ of a dollar. What part of a dollar did both cost? (4) Elsie solves 8 of her 10 problems. What part does she solve? (5) Maggie paid 40 cents for a veil. This was 4/5 of what she paid for a pin. How much did she pay for her pin?

Written Problems.

(1) A man said he owned 20/32 of a mill. What simpler fraction might he have used? (2) It takes 5½ yards of braid for Mary's skirt, 3⅓ yards for her waist, and 4⅙ yards for her jacket. How many yards does it take for the suit? (3) After buying 6 head of cattle at $65 each, Mr. Turner had $27 left. How much money had he at first? (4) A grocer had 72 gallons of molasses. He sold ¼ of it to one customer and ⅓ of it to another. How many gallons had he left? (5) A carpenter agreed to do a piece of work at $3¾ a day. He worked 7½ days. How much did he charge?

Grade—5B

FUNDAMENTAL WORK.

Oral—(1) 65 + 38; 65 — 38; 12½ × 10; 342 ÷ 10. (2) ¾ + ⅔; ¾ — ⅔; ¾ × ⅔; ¾ ÷ ⅔. (3) Change to hundredths: 7/10; 3/20; 4/25; ⅖; ½; ⅔; ¾; ⅛. Change to common fractions in lowest terms: .5; .10; .20; .25; .75; .12½; .66⅔. (4) 1 + .1; 1 — .1; 1 × .1; 1 ÷ .1. (5) 56 ÷ 8 × 4 + 2 ÷ 5 × 7 + 3 ÷ 5 — 7 × 5 = ?

Written—(6) From six hundred seven thousand five hundred twenty take eighty-four thousand seventy nine. (7) Add: 328,793, 58,402, 1,649, 908, 376,482, 73, 13,765, 8,078. (8) 85.72 × 608. (9) 835,240 ÷ 256. (10) Write in figures: MCDXCII. Write in Roman numerals: 1776.

Oral Problems.

(1) At 12½ cents apiece, what will half a dozen collars cost? (2) Ned sold his rabbit for 30 cents. This was ⅗ of what he paid. What did he pay for the rabbit? (3) Carrie pledged $1 to the children's aid society. How long will it take to pay it, if she earns 15 cents every week and her mother gives her 5 cents every week? (4) In making candy, Emma used .25 of a pound of chocolate and .75 of a pound of sugar. What was the weight of both? (5) What is the area of a square .5 of a yard long? What is its perimeter?

Written Problems.

(1) Oil is worth at the wells 37½ cents a barrel. What are 1,000 barrels worth? (2) For 5½ days' work a gardener received 13¾ dollars. How much did he receive a day? (3) At 12 cents a pound, how much must be paid for 12 cheeses, each weighing 12⅝ pounds? (4) How far will a railroad train run in 2.4 hours if the rate is 40.75 miles an hour? (5) Mr. Adams bought an automobile for $975, paying $450 in cash and agreeing to pay the rest at $75 a month. How long did it take him to pay for it?

Grade—6A

FUNDAMENTAL WORK.

Oral—(1) 134 + 67; 134 — 67; $32 × .25; $20 ÷ $0.12½. (2) 6/7 of 42 = ? 42 is 6/7 of what number? 42 is what part of 56? (3) Give per cent. equivalent of: ½, ⅓, ¼, ⅕, ⅙, ⅛, 1/10, 1/20, 1/25, 1/50. (4) Give common fraction equivalents of: 10%, 12½%, 16⅔%, 20%, 25%, 33⅓%, 37½%, 50%, 62½%, 66⅔%, 75%, 83⅓%, 87½%. (5) .1 + .1; .1 — .1; .1 × .1; .1 ÷ .1.

Written—(6) Find the product of eighty-seven and five-tenths and two and four-hundredths. (7) 62,084 + .906 + .0025 + 400.4 + .016 + 57.08 + 100.087. (8) $500 — $299.65. (9) (1½ + 1⅔) × ⅚. (10) 22.525 ÷ 8.5.

Oral Problems.

(1) The frames for my eyeglasses cost $4½, and each of the lenses $1¼. What was the total cost? (2) How many handkerchiefs at 25 cents each can be bought for $2? $3.50? $0.75? $1¼? $6? (3) At 5 cents a quart, how much must be paid for 1 gallon 2 quarts of vinegar? (4) Max sold 72 newspapers on Thursday and 12½% more on Friday. How many did he sell on Friday? (5) A railroad company carried 1,000 people on an excursion for $750. How much did each person pay?

Written Problems.

(1) The boys of a baseball nine bought 4 bats @ \$0.50, 2 balls @ \$0.75, a catcher's mask for \$2.75, and 4 mits @ \$0.80. Make out the bill to the treasurer of the club. They shared the cost equally. How much did each pay? (2) Of the 450 pupils in a school 42 per cent. are boys. What per cent. are girls? How many girls in the school? (3) A fruit dealer paid \$77 for oranges at \$2.75 a box. How many boxes did he buy? (4) Mr. Chapin uses a gallon of gasolene in driving his automobile 18 miles. How far can he go if he has 4 gallons 3 quarts of gasolene? (5) Mr. Parsons bought a horse for \$150. After keeping it 10 weeks at a cost of \$5 a week, he sold it at a gain of 10% of the entire cost. How much did he gain? What was the selling price?

Grade—6B

FUNDAMENTAL WORK.

Oral—(1) $253 + 87$; $253 - 87$; $\$36 \times .75$; $\$24 \div \$0.66\frac{2}{3}$. (2) $\frac{4}{5} + \frac{3}{4}$; $\frac{4}{5} - \frac{3}{4}$; $\frac{4}{5} \times \frac{3}{4}$; $\frac{4}{5} \div \frac{3}{4}$. (3) $.1 + .01$; $.1 - .01$; $.1 \times .01$; $.1 \div .01$. (4) 25% of 20 = ? 150% of 20 = ? 20 is 25% of what number? 20 is 125% of what number? 20 is what per cent. of 20? 20 is what per cent. of 25? 20 is what per cent. of 15? (5) $108 \div 9 + 8 - 4 \times 6 \div 8 + 8 - 5 \times 3 \div 9 + 5 = ?$

Written—(6) How many times is eight and six-tenths contained in sixty-nine and five hundred twenty-eight thousandths? (7) $347.29 + 1.0875 + 30.907 + .0039 + .56 + 4.905 + 100.00875 + 6.06 + 78.0329$. (8) 376.84×7.05. (9) \$5,000 — \$324.67. (10) $(\frac{5}{8} - \frac{2}{5}) \times (\frac{3}{4} + \frac{2}{3})$.

Oral Problems.

(1) Harry earned \$3 a week for 5 weeks. He then bought a suit for \$12¾. How much had he left? (2) In a storm at sea ¼ of a cargo of fruit was thrown overboard and ⅖ was spoiled. What part of the cargo was lost? What part was saved? (3) What part of an acre is a lot of land 8 rods by 2 rods? A lot 10 rods by 10 rods? (4) Frances earned \$25. She bought a dress for \$12, a hat for \$4, a pair of shoes for \$3, and put \$6 in the bank. What per cent. of her \$25 did she pay for each article? What per cent. of her earnings did she save? (5) If a dealer pays 25 cents a yard for cloth, for how much must he sell it to gain 20 per cent.?

Written Problems.

(1) A cubic foot of ice weighs 57.5 pounds. What is the weight of a cake 2 feet long, 2 feet wide, and 1½ feet thick? (2) What is the area of the top of a table 4 feet 8 inches long and 2 feet 6 inches wide? (3) David runs a 100-yard dash in 12 seconds. How many feet in a second? (4) Mrs. Adams bought a 56-pound tub of butter at 25 cents a pound; 8% of the butter spoiled. What was the money loss? (5) Mr. Arthur R. Bean rents a house to Mr. Charles L. Roper for \$18 a month. Make out a receipt for rent received for the month of July, 1912.

Grade—7A

FUNDAMENTAL WORK.

Oral—(1) 342 + 89; 342 — 89; \$0.37½ × 40; \$40 ÷ \$0.37½. (2) 3⅗ + 5½; 4¼ — 2⅝; 3⅝ × 16; 4½ ÷ 1½. (3) .5 + .05; .5 — .05; .5 × .05; .5 ÷ .05. (4) A tax rate of 2 mills on a dollar is how much on \$100? On \$1,000? (5) 62½% of 48 = ? What per cent. of 35 is 28? What number increased by 20% of itself is equal to 72? 30 is 83⅓% of what number?

Written—(6) Write in words: 40, 805, 015, MDCCLXXXIII. (7) Write in Roman numerals: 1915. (8) What is the product of one hundred and one-hundredth and ten and one-tenth? (9) 222,488 ÷ 548. (10) Find the sum of ten consecutive numbers beginning with 87,975.

Oral Problems.

(1) How many gross of pencils in 8 boxes of 6 dozen each? (2) Inez paid a bill with dimes, nickels, and cents, using 10 dimes, one-half as many nickels, and one-fifth as many cents. What was the amount of the bill? (3) Maria earns 25 cents each week. She saves 3 cents out of every 5 that she earns. What per cent. does she save? How much does she save? (4) What is the net price of 5 books at \$2 each, 20% off? (5) Stephen paid 96 cents for a geography and 62½% as much for a grammar. How much for his grammar? For both?

Written Problems.

(1) What is the cost of a fountain pen if a profit of 15% is made by selling it for 69 cents? (2) In the national baseball league in 1910 the Chicago club won from the other seven clubs 14, 12, 14, 16, 16, 15 and 17 games, respectively, and lost to the same clubs 8, 10, 8, 6, 6, 7 and 5 games, respectively. Find the standing of the club in per cent. (3) A co-operative grocery store allows its shareholders a discount of 5% from the regular prices. What will a shareholder pay for a barrel of flour at \$6.40 and 3 tons of coal at \$7.20 a ton? (4) How much interest is due Oct. 17 on a note for \$1,485, dated June 26, with interest at 5%? (5) Cash account of Mrs. Green: Receipts: Mar. 1, 1911, on hand, \$10; Mar. 4, rent from rooms, \$32.00; Mar. 15, pension, \$12.00; Mar. 18, sewing, \$9.00; Mar. 25, board, \$16.00. Expenses: Mar. 6, groceries, \$15.00; Mar. 7, provisions, \$18.00; Mar. 11, milk, \$2.80; Mar. 15, gas, \$4.50; Mar. 21, clothing, \$12.50. Write the account in proper form.

Grade—7B

FUNDAMENTAL WORK.

(1) 246+87; 246—87; \$3.50×2,000; 24,800÷2,000. (2) 4¼+ 3⅝; 4½—2⅔; 18×⅝; 2⅖÷⅕. (3) 1.6+.8; 1.6—.8; 1.6×.8; 1.6÷.8. (4) 12+8÷4=? (12+8)÷4=? .2×.3×1=? .2×.3×.1=? (5) What is 120% of 40? What number decreased by 25% of itself equals 48? 60 is 125% of what number? What per cent. of 36 is 48?

Written—(6) Find the sum of: six thousand seventy-two and thirty-eight thousandths; thirty-seven and six thousand eight ten-thousandths; three hundred three; three hundred and three thousandths; three hundred three thousandths; seven hundred six and eight-tenths; eight thousand seven and sixteen thousandths. (7) Write in words: 5,050.0505. Write in Roman numerals: 1775. (8) \$12,342.70—\$4,853.85. (9) 487.35×807. (10) 78.54÷3.1416.

Oral Problems.

(1) Find the rate per dozen when 4 articles are sold for 15c.; 6 for 75c.; 3 for 10c.; 2 for \$1.25; 8 for 20c. (2) A suit cost \$27. This was 90% of the cost of a coat. Find the cost of the coat. (3) Eight drinking fountains were placed in a school building at an average expense of \$6⅘. How much did they cost? (4) Find the surface area of a block of wood 3 inches square and 4 inches high. (5) Mr. Magoon's cow gives 8 quarts of milk in the morning and 12 quarts at night. The night's milking is what per cent. of the whole quantity?

Written Problems.

(1) At 6 cents a square foot, how much will it cost to line with zinc a tank 3 feet long, 2½ feet wide and 2 feet deep? (2) A pond 120 feet in diameter gives what area for skating when frozen over? (3) Find the net amount of a bill for 50 geographies @ \$1, and 80 arithmetics @ \$0.65, with discounts of 16⅔% and 3%. (4) What is the actual cost to the importer of a suit of clothes bought in England for £4 on which is paid an ad valorem duty of 40%? (5)

\$750. ALBANY, N. Y., Nov. 19, 1912.

Ninety days after date, for value received, I promise to pay to the order of E. B. Payson, Seven Hundred Fifty Dollars, at the Hudson National Bank. ARTHUR M. HOYT.

Find the proceeds if discounted January 16, 1913, at 7%.

Grade—8A

FUNDAMENTAL WORK.

Oral—(1) 24×\$0.87½ \$14÷\$0.87½; 35,000÷2,000. (2) 1% of \$4,800. (3) A rate of 2½c. per board foot is what rate per M.? A rate of \$56 per M. is what rate per C.? (4) 5% of \$800 + \$4.75 = ? (5) What is the ratio of 15 to 25? 2:5::6:?

Written—(6) Add: \$234.79, \$685.23, \$6.87, \$123.08, \$49.97, \$529.25, \$0.76, \$906.84, \$76.42, \$3,075.08, \$695.02, \$4,108.37. (7) Write in figures: forty million four thousand four; MCMXV. (8) .1776÷4.8. (9) 82,418 —36,749. (10) 5,682×3,007.

Oral Problems.

(1) Six people hire an automobile for 8 hours at \$1½ an hour. What is each one's share of the expense? (2) By selling a field for \$560, Mr. Grant received 1/7 more than cost. Find the cost. (3) If in making ice cream 1 pint of cream is mixed with 2 quarts of milk, what per cent. of the mixture is pure cream? (4) Reckoning 7½ gallons to a cubic foot, how

many gallons can be contained in a tank 2 feet square and 2 feet deep? (5) What is the ratio of 1 lb. 4 oz. to 2 lb.?

Written Problems.

(1) The speed of two automobiles are to each other as 8 to 15. If the rate of the slower is 20 miles an hour, what is the rate of the faster? (2) A watering trough is 2 ft. 6 in. long, 2 ft. 4 in. wide, and 1 ft. 10 in. deep. How many gallons will it hold? (3) When flooring is selling at $60 per M., what is the cost of laying a floor 18 ft. × 15 ft., allowing 1/10 for waste and $7.75 for labor? (4) The assessors estimate Mr. Fay's property as follows: bonds, $1,200; house, $3,600; 10,000 square feet of land at 20 cents per square foot. Find the total valuation. Find Mr. Fay's tax if the rate is $16.50 per $1,000. (5) Mr. Arthur B. Cady, who owns a fishing vessel worth $4,200, sells a three-sevenths interest to Mr. Horace C. Ridlon, accepting in payment a note due in 6 months, with interest at 5%. Write the note and compute the amount due at settlement.

Grade—8B

FUNDAMENTAL WORK.

Oral—(1) $0.62½ × 56; $12 ÷ $0.16⅔; ½c. for one is — per C., and — per M. (2) Express with the sign %; 1; ½; 2¼; .1; .01. (3) $13 = ?$ $10^3 = ?$ $.1^3 = ?$ (4) $100^2 = ?$ $\sqrt{100} = ?$ (5) 2 lb.: 1½ lb. = 16c.:?

Written—(6) Add: 321.17, 5.08, 306.92, 95.875, .08, 3.065, 379.609, .9. 83.947, 60.066. (7) $16,360.82 — $7,952.97. (8) Multiply eight hundred seventy-five thousandths by sixteen and four hundredths. (9) 57.5 ÷ .092. (10) $(2/7 + ⅔) \div (⅝ \times ⅔)$.

Oral Problems.

(1) What is the cost of 5 cwt. of shorts at $16 per ton? (2) How many rods of fence will inclose a field 25 rd. long whose width is ⅖ its length? What is the area of the field? (3) What is the premium for insuring a house for $3,200 at ⅞%? (4) A newsboy buys papers at ½c. each and sells them at a cent apiece. What per cent. does he make? (5) What is the surface area of a 5-in. cube? Its volume?

Written Problems.

(1) Mr. Green's property tax is $75, and his water tax is .1 as much. The amount of his property and water tax is .1 of the value of his property. Find the value of the property. (2) Mr. Morrison's house is 36 feet square and stands in a square lot containing 9,025 square feet. Find the area covered by the house. Find the length of the lot. (3) Mr. Ballard bought a lot of land for $1,200 and on it built a 4-tenement house for $4,800. In one year he received an average monthly rental of $17.50 for each tenement, and paid $75 for taxes and insurance and $285 for repairs. Find the per cent. of income. (4) The gross proceeds of a sale of strawberries were $506. The charges were: express, $3.75; cartage, $2.80; agent's commission, 5%. Find the net proceeds. (5) Find the interest at 5% on $2,384 from April 16 to September 3.

Efficiency in Arithmetic Teaching

By John H. Walsh, Associate Superintendent of Schools, New York City.

There is an old and a slanderous story of a boy that sought home assistance in the solution of a troublesome problem. He first applied to his mother, an A. B. of Vassar. She obtained the result in a few minutes, but was unable to convince her son that her work was correct. The problem was presented to the father, a Harvard graduate. The fact that the latter's answer agreed with the mother's did not satisfy the lad, who insisted that both had made some blunder or other. Upon his return from school next day he took great pleasure in telling his parents that the teacher confirmed his opinion of their work.

"What was the matter with it?" asked the father. "You left out two 'therefores' and a 'hence,'" was the gleeful reply of the boy.

While very few teachers reject a correct answer because of the omission of useless details, some judge of a pupil's mathematical progress by his ability to employ unnecessary words and figures.

Waste Motions.

Investigations made by efficiency engineers into the methods prevalent in laying bricks, handling pig-iron, shoveling ore, etc., showed that in many cases nearly one-half the time spent in the usual customary motions was sheer waste, and that a thoroughly systematized procedure would increase the piece-work pay of the workers one-third or more with even less than the usual fatigue.

The teacher that finds it difficult to complete the arithmetic work of her grade in the allotted time should investigate her procedure to ascertain whether or not she retards the progress of her pupils by the waste motions she insists upon or permits.

Rapidity and Accuracy.

Dawdling in the performance of arithmetical operations almost necessarily develops inaccuracy. The more rapidly a child calculates, within reasonable limits, the more likely is his work to be correct. The larger the number of examples he works during his course the greater will be his progress. The shorter the time that is given to non-essentials the longer will be the time available for work that counts. "The more haste, the less speed" should be changed, as far as arithmetic is concerned, to "The slower the speed, the greater the inaccuracy."

Numeration and Notation.

Any class can be taught during a portion of a single recitation period to read and to write the numbers prescribed for the grade, if the teacher refrains from explanations that befog the matter. Talks about periods, orders, place values, etc., are of no assistance whatever in enabling a child

to write 64 in one grade, 206 in another, or 1,007 in a third. Not until the study of decimals is commenced should the place value of figures receive any consideration.

Preliminary Preparations.

Time is lost by some classes in getting ready for work. While careful writing of figures, their orderly arrangement, etc., are of assistance in securing rapidity and accuracy, the elaborate headings required by some teachers, red-ink rulings, and the like, diminish the number of examples that can be worked. Efficient management gets the class ready for work in a minute or two and keeps the pupils awake during the recitation period.

Written Addition.

The preliminary work at the blackboard should give the class the proper method. The pupil adding 43 and 25 aloud should not be permitted to say anything more than "8" (writing it), "6" (writing it) and possibly "Answer, 68." The teacher that decomposes 43 into 4 tens and 3 ones, 25 into 2 tens and 5 ones is hurting the class.

```
43
25
—
68
```

The pupil that adds aloud 73, 6, and 134 should say only "10, 13" (writing 3); "4, 11" (writing 1); "2" (writing it). "Answer, 213."

A few very worthy people—not business men—still argue in favor of the employment of several ingenious methods of wasting time at this stage; but their number is gradually diminishing. Not so very long ago there were many believers in the infliction of the "Why" of processes; they are at present largely outnumbered by those who teach only the "How."

```
 73
  6
134
——
213
```

Definitions and Technical Terms.

The fact that definitions are found in text books suffices to convince many well-meaning people that a pupil must derive some occult benefit when he memorizes one of them. The efficient teacher will content herself with having them read aloud and their meaning discussed, especially in the upper grades. She will gradually introduce the necessary technical terms, and expect the pupils to use them as occasion requires. She will remember, doubtless, that she lived many a year without hearing of an *addend*, and that she as yet is not always sure which of the two is the *subtrahend;* so that she will not bother much with these terms, nor with *orders, periods*, and the like.

Unnecessary Words and Figures.

From the first written exercise children should add, substract, etc., only in the way they will follow after leaving school. The employment of carrying figures and the like tends to produce inaccuracy by diminishing concentration. The teacher that suggests them to her pupils injures them, although unintentionally. The teacher that requires the writing of unnecessary words in connection with an example or a problem is wasting their time.

Prevention of Waste.

In all written exercises the pupil should be limited to a single sheet of paper upon which all of the work should be shown, the use of an eraser not being permitted. In this way the teacher can discover any tendency towards the employment of unnecessary figures. A pupil that writes a subtrahend above a minuend should be required to obtain the remainder without rearranging the two former. Side calculations of every kind should be discouraged.

Some Forms of Waste.

Teachers that do not understand the proper use of a text-book occasionally follow the type forms of solution presented therein. The latter are supplied for pupils studying by themselves or for the instruction of parents who desire to learn a process in order to help their children. The school boy's composition on pins described them as useful since "they save people's lives by not swallowing them." Model solutions are valuable in the class-rooms as things to be avoided.

An occasional teacher still requires her pupils to write "minuend," "subtrahend" and "remainder" alongside the appropriate numbers. While she may not insist upon a similar practice in multiplication or division, she requires children to express "place" values in stating the method followed. In dividing 13728 by 4, the pupil is still expected in some places to say that 4 in 1 ten thous. 4)13728 and doesn't go; that he reduces 1 ten thousand to 10 thousands, to which 3 thousands are added, making 13 thousands, which contains the division 3 thousand times, leaving a remainder of 1 thousand, etc., etc.

This may seem a ridiculous procedure, but it is strictly scientific, and the science of arithmetic was the fashion among advanced thinkers until very recently.

A child should always be required to take the proper number of figures in the dividend, 13 in the above example, without stating their place value, and without the unnecessary statement that 4 into 1 doesn't go. In subtraction, two, he should omit "4 from 2 I cannot take" and use 12 at once.

To ask a child "How many steps are there in long division?" wastes time. Pupils learn to divide by dividing. In each example they (1) find quotient figure, (2) multiply, (3) substract, and (4) bring down the next figure, almost instinctively, after working an example or two. All that is necessary on the teacher's part is to begin with the simplest type, say, $231 \div 21$, and to slowly increase the difficulties. Bringing too many things to the child's consciousness distracts his attention from the main point.

Least Common Multiple.

The chief reason for teaching least common multiple is the fact that unless it is mentioned in school, children will never hear of it. The least common denominator of the fractions to be added in later life is practically always determinable by inspection.

Assuming, however, that an example in addition contains the fractions ⅔, ¼, ⅗, ⅙, 7/12, 11/30, 32/45 there is no need of writing 3, 4, 5, 6, 12, 30, and 45 to get their least common multiple. The pupil should omit 3, which is contained in 6; 4, which is contained in 12; 5 and 6, which are contained in 30, leaving only 12, 30, and 45. After dividing by 2, he cancels 15, which is contained in 45; and then divides by 3.

2)	12	30	45
3)	6	15	45
	2		45
			15

When the denominators that are factors of others are rejected, it is frequently possible to determine by inspection the least common multiple of the few remaining ones.

The method of ascertaining the least common multiple of a series of numbers by first writing the prime factors of each is confusing to children. The scientific teacher likes it because it furnishes an opportunity for much bewildering talk. The value of the method given above is that it presents time-consuming explanations.

Greatest Common Divisor.

It is generally possible to reduce a fraction in a result to its lowest terms by dividing the numerator and the denominator by one or more numbers, it not being of any consequence that the greatest common divisor be used at first. When the pupil sees that 2 is a factor common to both terms, or 3 or 5, he should begin with one of them.

If, however, a common factor is not readily seen the "continued division" method of obtaining the greatest common divisor should be used in preference to the method by factors.

One reason for its use is the impossibility of making children understand the underlying reasons; another is that a method of obtaining the least common multiple be as different as possible from the one employed in ascertaining the greatest common divisor.

It is not strange that a pupil after factoring 12, 30 and 45, hesitates as to the factors that should be taken in a given case. For one purpose he must take $2 \times 2 \times 3 \times 3 \times 5$; and for the other, $2 \times 3 \times 5$, with several factors omitted in each case.

$$12 = 2 \times 2 \times 3$$
$$30 = 2 \times 3 \times 5$$
$$45 = 3 \times 3 \times 5$$

Multiplying and Dividing Fractions.

Children should be practised in writing from the book or the blackboard the answers to such examples as $124\frac{3}{5} \times 8$, $274\frac{2}{3} \times 12$, etc., to correct their tendency to spin out the work. The child can be taught to think 8 times ⅗ are 24/5, or 4⅘, to write ⅘ and carry 4, etc., as a business man does.

The average pupil when called upon to divide 1,876 12/17 by 4, unnecessarily reduces the mixed number to an improper fraction—a tedious performance which should be discouraged. Writing only the answers, as suggested above, tends to effect a cure.

The teacher should, of course, prepare graded examples when they are not provided by the text book. The following types of preliminary sight exercises show the development. In (a) the pupil thinks 6 into 30, 6 into 6 sevenths. In (b) he thinks 6 into 48, ⅙ of ½. In (c) he reduces the remainder 1⅕ to 6 fifths, into which 6 goes ⅕ time. In (d) he finds ⅙ or the 2⅓ remainder (⅙ of 7/3 = 7/18). In (e) he takes ⅙ of 2¼, and reduces the resulting 9/24 to ⅜.

(a) 6)30 6/7

(b) 6)48½

(c) 6)49⅕

(d) 6)50⅓

(e) 6)50¼

Too much stress cannot be laid upon the value of exercises requiring that only answers be written to examples written on the blackboard or contained in the text book. Even when there is no question of a short method it saves the time needed to writing out the numbers.

Work at the Blackboard.

Children must learn to manipulate numbers without always placing them in a certain position. Some are unwilling to write 17 as the product of 68 by ¼ without rewriting 68, and placing 4 in front of it with the hook to indicate division.

```
  68
×12¼
----
  17
```

```
4)68
 —
```

When work at the blackboard indicates any form of waste the class should be called upon to show possible economy of time and chalk. When a problem is worked by a pupil, a call should be made for a possible shorter solution.

The teacher should frequently dictate to a pupil at the board an example such as the product of 1,876 by .25 33⅓% of $9,216. While the child should be required to get the result by dividing by 4 in one case and by 3 in the other, the work should appear just in the form here shown.

```
 1,876
×.25
----
 469
```

```
$9,216
  33⅓%
-------
$3,072
```

Making Out Bills.

A class exercise in making out a bill affords the teacher an opportunity to give a lesson in the avoidance of waste. She supplies a piece of paper just large enough for the bill, and requires that no other paper be on the desk. After the pupils have written the various headings she dictates quantities and prices that can be extended without difficulty.

The following are types for an upper grade:

121 pounds	$.24	329 bushels	$25.00
16¾ yards	.12	25 barrels	6.48
12½ bushels	.96	99 yards	.87

The child should learn that he does not require partial products in multiplying 121 by 24, and that it is not a crime to use the latter as the multiplier even when it is a concrete number. In multiplying 16¾ by 12, he "adds in" 9 (the product of ¾ by 12). Although 12½ bushels is not

$118, he realizes that the result is the same as the cost of 96 bushels at 12½c.

By careful selection of quantities and rates to suit the capacity of the pupils an opportunity is given to drill the latter through several grades in doing things the way they are done in business.

The Backward Child.

In her efforts to help the average pupil, the teacher must not neglect either the brighter ones or the slow ones. Additional work must be provided for the former and extra time must be allowed the latter. It is not necessary that all members of a class should work the same examples or the same number of examples. The boy or the girl that really needs to count on his fingers or to use the multiplication table should not be prevented from doing either.

Provided a pupil gets his answer correct every time to one or two examples belonging to each topic of his grade he should not be deprived of promotion because of his inability to work as rapidly as his mates. While he may not be competent to become an entry clerk or an accountant, he may develop into a very useful member of society.

There are many callings in which "quickness at figures" is of slight importance, and a pupil should not be deprived of an opportunity to extend his studies in language, geography, etc., because of his inability to handle numbers as rapidly as the average boy. He should, however, be given every opportunity to make the best possible use of the arithmetic period, even if he does only a fraction of the work.

Speed Contests

By Eva F. Buker, Brooklyn Training Schools for Teachers.

Speed contests have little or no place in the first two years of school as now arranged. These years should be devoted to the acquisition of a knowledge of the number facts of the four fundamental operations. In this way is laid a foundation for the correct use of numbers, in school or out, in the succeeding years.

Pupils should be trained to be *accurate always,* and to work *promptly.* This does not come of itself; it requires eternal vigilance on the part of the instructor. For most children it is easy to dawdle, especially in arithmetic work.

During the third year the storing up of foundation facts should be continued. A contest implies preliminary preparation. The first three years of school are largely preparatory. One may, however, introduce *speed contests* this year with work that is simple and easy. To be valuable, the speed contest must be a pleasure, the contestants must be happy in the work. To start right let the first contests be rather easy. If the contest is to be of real value to the pupils, definite conclusions must be drawn from it.

When a certain process has been reviewed and re-reviewed and the pupils have had much practice in *doing,* then the teacher may prepare a series of similar examples or problems, and time the pupils.

This timing may be a certain number of minutes for the whole series, recording at the end the number of pupils who have done all correctly, the number who have all but one correct, and so on. Or a record may be made of the pupils in the order in which they finish, only those who have all correct being counted. Other ways may be devised.

Speed contests should not be over ten or fifteen minutes in length for the third, fourth and fifth years. They should not be held every day. After a contest as outlined above, the regular work proceeds, with continued practice upon old and new topics. When two or three weeks have elapsed, try the same series of examples or problems again, and make a careful record of results. Compare the results of the two contests and find out what improvement, if any, has been made. Repeat the series from time to time until a decided improvement is evident. Let the pupils compare results. This will spur them on to work between contests that good showings may be made at the trials.

By the fourth year pupils should have received the training for accuracy and should have gained speed in the use of the fundamental facts of arithmetic. From the fourth to the seventh years frequent speed contests may be of service to pupils—not only those who go on to higher work in mathematics, but equally to those who go from the school to work. The teacher should plan his part—the careful telling of what is to be done—so that no instant of time is wasted in getting ready and starting.

If pupils have their books from which to read the examples and either state the answer without copying the numbers, or find the answer after copying the numbers, the time limit may be a little less than if the numbers are copied from the board or from dictation.

If the copying is to be done from the board then the examples should be put on before school and kept covered until the time for using them.

Without telling pupils what is to be done with the examples, the teacher may dictate the numbers for all the examples, and when this is done tell the pupils what is to be done, and then time the actual operation, whatever it is. At first plenty of time should be allowed for the average pupil, but as practice continues, narrow the time until the contest really becomes one of speed.

Third Year.

Allow 15 minutes for each exercise at the first trial. Allow 10 minutes for the second trial.

(1) Copy and add—(1) 3754 + 2371 + 582 + 1037 + 91; (2) 213 + 3209 + 4165 + 84 + 178; (3) 3004 + 706 + 85 +1562 + 367; (4) 968 + 37 + 115 + 6 + 13; (5) 5803 + 326 + 49 + 11 + 360.

(2) Copy and subtract—(1) 375 — 162; (2) 689 — 546; (3) 846 — 325; (4) 1964 — 403; (5) 3720 — 1610; (6) 1573 — 243; (7) 4876 — 676.

(3) Copy and subtract—(1) 6203 — 3402; (2) 5041 — 176; (3) 8530 — 2913; (4) 6071 — 1509; (5) 5453 — 604; (6) 7004 —1782.

(4) Find the products of (1) 24 and 1/33; (2) 208 and 46; (3) 149 and 62; (4) 52 and 166; (5) 314 and 54; (6) 216 and 36.

(5) Find the quotients and prove. Divide—(1) 760 by 2; (2) 876 by 3; (3) 688 by 4; (4) 726 by 6; (5) 805 by 5; (6) 906 by 6; (7) 850 by 2; (8) 510 by 3; (9) 928 by 4.

Fourth Year.

First trial—Allow 10 minutes for exercises 1 and 2. Allow 15 minutes for each of the others.

(1) Copy, add, and test—(1) \$1925 + \$47.75 + \$130.23 + \$5.92 + \$1.89 = ? (2) \$35 + \$.29 + \$1.28 + \$.17 + \$19.22 = ? (3) \$.72 + \$3.25 + \$908 + \$.85 + \$400.46 = ?

(2) Find the remainders when—(1) 1375 is taken from 91213; (2) 2098 is taken from 20109; (3) 4647 is taken from 81318.

(3) Multiply and test—(1) 185 by 270; (2) 324 by 218; (3) 689 by 260; (4) 807 by 123; (5) 321 by 129; (6) 800 by 690.

(4) Divide and test—(1) 5456 by 31; (2) 21462 by 51; (3) 34701 by 43; (4) 17514 by 63.

(5) Divide and prove—2289, 9147, 2061, 1673 by 48; 2266, 2153, 8152, 4937 by 76.

(6) Reduce to improper fractions; write the answer only—(1) 3 1/7, 5⅔, 8¾, 7⅓, 2 11/12; (2) 2⅛, 6¾, 9⅔ 11½, 3 5/11; (3) 4⅕, 9⅖, 7 5/12.

Oral Drills for Ten Minutes.

(1) Write the answers only—(1) ½ of 36, 40, 48, 54, 56; (2) ⅓ of 24, 36, 48, 51, 57; (3) ¼ of 20, 28, 36, 44, 52; (4) ⅔ of 15, 18, 24, 27, 36; (5) ¾ of 16, 24, 36, 32, 44.

Fourth and Fifth Years.

Allow 15 minutes for each exercise.

(1) Subtract and prove—(1) 68401 — 10465; (2) 45672 — 25674; (3) 25640 — 11982; (4) 35121 — 26912; (5) 84200 — 21931; (6) 83601 — 22789.

(2) Find the cost of—(1) 23 tables at $12.25 each; (2) 31 cabinets at $43.35 each; (3) 41 wardrobes at $52.09 each; (4) 72 bookcases at $65.50 each; (5) 55 chairs at $11.75 each.

(3) Divide and prove—(1) 4189, 3564, 1228, 8532, 2943 by 27; (2) 3660, 8736, 11457, 14398, 32480 by 28.

(4) Copy, reduce and add—(1) 3/4 + 2/3, 3/4 + 3/5, 3/4 + 3/7, 3/4 + 5/6, 3/4 + 1/10; (2) 5/6 + 1/3 + 2/9, 4/7 + 1/14 + 3/5, 1/8 + 1/5 + 3/10, 4/7 + 1/3 + 1/6, 1/8 + 1/4 + 1/12; (3) 5/6 + 1/5 + 1/3, 3/7 + 4/5 + 1/10, 5/8 + 2/3 + 1/12, 3/5 + 3/8 + 3/4, 2/3 + 3/5 + 5/6.

Fifth and Sixth Years.

Copy, add and test these five examples in ten minutes—(1) 2473, 4870, 642, 1069, 4322, 718; (2) 1961, 35, 3778, 813, 4596, 3008; (3) 6059, 1273, 4807, 5846, 2319, 1871; (4) 6718, 4329, 1008, 6464, 7286, 1942; (5) 378, 1384, 27, 1916, 422, 8143. Sixth year pupils may do these in less than ten minutes.

Copy, subtract and test in five minutes—(1) $29.67 — $18.39; (2) $367.25 — $189.89; (3) 22675 — 18983; (4) 109600 — 98775; (5) 296391 — 148687. A few days after the first trial do these again and see if you have gained in speed.

Try to do correctly the following examples in ten minutes—(1) 2009 × 1838; (2) 1508 × 1079; (3) 289 × 4167; (4) 560 × 4781; (5) 3265 × 1987. Sixth year pupils should do them in less time.

Fifth or sixth year ten minute exercise—Divide (1) 8725 by 25; (2) 62923 by 79; (3) 17088 by 356; (4) 158776 by 413; 5) 10260 by 285.

Oral Drills for Speed—Fifth Year.

Keep a record of the time required for each exercise.

(1) Find the sums—3/8 + 5/8 + 7/8; 4/5 + 2/5 + 7/5; 5/8 + 3/8 + 4/8; 3/5 + 1/10 + 2/10; 5/6 + 5/12 + 7/12; 7/9 + 3/9 + 5/18; 7/8 + 5/12; 2/9 + 3/36; 5/8 + 5/24.

(2) Find the differences—5/8 — 3/8; 7/12 — 3/8; 7/9 — 4/9; 5/8 — 9/24; 7/24 — 1/12; 8/15 — 1/5; 4 7/8 — 2 3/8; 2 5/8 — 1 3/4; 6 1/6 — 5 5/6; 9 1/4 — 2 3/8; 2 1/2 — 1 3/4; 3 3/4 — 1 1/4. Sixth and seventh year pupils may be expected to do these in less time than fifth year pupils.

(3) Multiply—1/3 × 3/4; 5/6 × 12/10; 2/3 × 5/6; 3/4 × 7/8; 2/7 × 14/15; 3/8 × 12/13; 4/5 × 12/16; 6/7 × 21/18; 3/10 × 4/5; 2/5 × 15/9; 3/7 × 21/25; 2/3 × 13/18.

(4) Divide—3/5 ÷ 2; 3/7 ÷ 6; 8/9 ÷ 5; 5/8 ÷ 12; 7/8 ÷ 3; 7/10 ÷ 10; 12/13 ÷ 7; 4/25 ÷ 5; 9/10 ÷ 5; 5/6 ÷ 2; 1/8 ÷ 8; 60/72 ÷ 12.

(5) Divide—3 ÷ 3/2; 4/5 ÷ 2/5; 7/9 ÷ 14/9; 1/4 ÷ 2/3; 4 ÷ 4/3; 6/7 ÷ 3/7; 5/11 ÷ 3/11; 3/5 ÷ 3/8; 4 ÷ 8/3; 9/10 ÷ 6/10; 1/3 ÷ 1/5.

Written Drill for Speed.

Keep record of the time it takes to do the five examples the first time you try them. Compare this with the time it takes a month later.

(1) Add—(1) 3 5/8 + 2 5/8 + 7 7/12 + 5 3/4; (2) 7 1/2 + 8 2/3 + 5 5/6 + 9 7/12; (3) 2 3/5 + 4 1/3 + 9 7/15 + 6 1/5; (4) 5 1/2 + 3 3/4 + 4 7/10 + 9 7/20; (5) 3 1/2 + 4 3/8 + 2 1/4 + 3 3/16. One speed exercise is enough for one day.

(2) Subtract—(1) 2⅗ — 1½; (2) 3⅞ — 2¾; (3) 5⅙ — 2⅔; (4) 8 9/10 — 7 10/20; (5) 9 5/24 — 6 7/12.

(3) Find the products—(1) ⅘ × 7/12 × 15/14; (2) 18/19 × 13/27 × 34/26; (3) 40/45 × 17/18 × 27/38; (4) 16/17 × 64/54 × 34/81; (5(17/18 × 56/51 × 63/91 × 85/72.

(4) Divide—(1) 1⅕ by 1½; (2) 3½ by 1⅓; (3) 5½ by 1¾; (4) 7½ by 2⅖; (5) 6⅔ by 1½; (6) 1⅔ by 1½; (7) 3⅕ by 1¼; (8) 6½ by 5⅚; (9) 5⅗ by 2⅔; (10) 6⅖ by 4⅖.

Fourth to Eighth Years.

Written.

Put down only the necessary numbers and find the answers and test in seven to ten minutes.

Find how much is gained on each of the following:

Merchandise.	Number of articles purchased and the cost of each.	Selling price.
1. Eggs	50 doz. at 25c. per doz.	40c. per doz.
2. Oranges	1 crate (120 oranges) at $3.50	40c. per doz.
3. Cuffs	5 doz. pr. at $1.90 per doz.	$2 per doz.
4. Hats	6 doz. at $9 per doz.	$92 for the entire lot.
5. Peaches	2 cases (24 cans) at $3.40 per case.	22c. per can.

Mental Arithmetic—Fifth to Eighth Year.

Write the answers and test in eight minutes.

Find the amount of change that should be given in each of the following:

	Purchase.	Money Paid.		Purchase.	Money Paid.
(1)	$ .89	$1.00	(6)	$6.50	$10.00
(2)	.68	2.00	(7)	3.89	5.00
(3)	3.68	5.00	(8)	7.75	10.00
(4)	2.27	3.00	(9)	2.63	4.00
(5)	1.28	2.00	(10)	8.11	10.00

To increase the value of this exercise for the seventh and eighth years, omit the zeros in the sums of money paid for the purchases.

Fifth to Seventh Years.

Oral Answers Written—A five-minute Exercise.

(1)—(1) .05 × .25; (2) .07 × .012; (3) .01 × 4.5; (4) .04 × 2.5; (5) .03 × 2.05; (6) .06 × 1.06; (7) .08 × .25; (8) .03 × 2.05.

(2)—(1) .48 ÷ 6; (2) .72 ÷ 8; (3) .81 ÷ 9; (4) 1.0 ÷ 2; (5) 1.2 ÷ 3; (6) 1.5 ÷ 5; (7) .008 ÷ 4; (8) .106 ÷ 2.

(3)—Give the quotients by inspection—(1) 11,421 ÷ 27 = 423. Divide 11.421, 1.1421, 1142.1 and .11421 by 27; (2) 168,096 ÷ 412 = 408. Divide 1680.96, 16.8096, 16809.6, 1.68096 by 412.

(3)—164,840 ÷ 317 = 520. Divide 164.840, 1.6484, 1648.4 and 16.484 by 317.

Fifth to Eighth Years.

See how many of these you can do correctly in 20 minutes:

Find the cost of—32 yards at 12½ cents, 64 yards at 87½ cents, 21 pounds at 33⅓ cents, 18 pounds at 66⅔ cents, 60 gallons at 30 cents, 40

pounds at 62½ cents, 24 pecks at 75 cents, 50 tons at $3.50, 48 pounds at $1.25, 15 yards at $1.60, 24 yards at $1.83⅓, 24 barrels at $2.37½, 12 barrels at $3.75, 6 tons at $4.16⅔.

A five-minute exercise—(1) Find the difference between $1076.55 and $379.25. (2) The subtrahend is 4,598,785; the minuend is 100,200,476; find the remainder. (3) Find the number that must be added to 6,789,563 to get 91,364,218. (4) Find the number that must be subtracted from 100,200,476 to get a remainder of 78,650,965.

Sixth and Seventh Years.

Reduction—Oral Drill.

(1)—Reduce to lowest terms:

18	35	27	32	15	28	81	56
—	—	—	—	—	—	—	—
24	45	45	60	40	42	63	45

(2)—Reduce to similar fractions—⅜ and 5/12; 5/9 and 5/12; ¾ and ⅚; 7/10 and ⅜; 5/18 and 1/24; 2/15 and 1/9; ⅞ and ⅚, 5/12 and 1/24.

The answers to the above may be given orally or written on paper.

Written Drill.

(1)—Reduce to lowest terms:

108	126	1377	221	611	207	4884
—	—	—	—	—	—	—
135	210	1539	273	370	259	4972

(2)—Reduce to similar fractions, having l. c. d.—23/24 and 17/18; 15/16 and 7/12; 13/15 and 7/35; 16/25 and 11/45; 13/20 and 11/32; 4/33 and 7/44.

Eighth Year.

Copy and find the sums in 10 minutes:

34,321	74,796	937,427
86,789	79,214	479,683
79,506	97,803	967,345
56,342	5,163	740,286
54,768	65,921	429,351
42,231	46,253	163,728
74,262	32,304	528,187
93,617	89,433	671,154
25,436	8,275	229,861
80,783	2,935	235,132
54,937	71,684	825,510
36,451	39,466	932,468
———	———	———

Oral Drills.

(1)—Find in five minutes—⅘ of 35; ⅞ of 96; 7/15 of 60; ⅞ of 56; 9/10 of 120; 12/50 of 250; 9/11 of 121; 11/12 of 122; 15/20 of 240.

(2)—Answer in ten minutes—15 is what part of 60? Of 90? Of 100? 7 is what part of 56? Of 84? Of 91? ⅓ is what part of ⅚? Of 7/12? Of 10/15? 2½ is what part of 10? Of 35? Of 50? 5½ is what part of 11? Of 55? Of 66?

Tests for Speed and Accuracy in Arithmetic

By Edward L. Thorndike, Teachers College, Columbia University.

I have been asked to make some suggestions concerning convenient and instructive tests for speed and accuracy in the arithmetic of the elementary school, for use by school principals and others who desire to measure the ability or the progress of school pupils. I may say at the outset that there are an infinite number of good tests that could be arranged for this purpose; and that, on the other hand, just precisely which is the best way to occupy, say ten minutes of the time of the pupils in a given grade, so as to get the most convenient and accurate information, is probably known to nobody. Until many tests have been themselves tested so that we know just the time that is required to score the papers and just how fully the result of the test informs us concerning the condition of the pupil at the time, we are unable to devise the one best test in general or the one best test for any special purpose.

The tests which have been devised by Mr. Courtis are excellent in themselves for the limited purposes for which he uses them, and under his energetic management they have been so widely given that any teacher who uses them with his own classes has means of comparison at hand that cannot be found for any other group of tests. These tests of Mr. Courtis, then, should be familiar to, and used by, every school principal interested in this matter. Where it is desirable to have a measure of *progress*, the Courtis tests should be arranged in duplicate or triplicate (or even in a series of ten) sets, each of equal difficulty. This can be done by changing the order in the case of the simpler tests, and by changing the particular digits used in the computation in the more complex tests of computation. In the test of so-called "reasoning," problems of equal difficulty should be sought.

We have found tests in simple single-column addition as shown below (Test A) very useful, inasmuch as they eliminate the speed of writing from consideration. We have also found a test such as is shown in part below (Test B) with the divisions, with and without remainders, from 10 divided by 2 up to 81 divided by 9, useful. The results of work with these tests by Donovan and Thorndike, Hahn and Thorndike, and by Kirby will shortly be published, and these will give certain standards of accomplishment and improvement.

Test A.

2	3	3	9	4	9	3	2	9	8	7	6	7	5	6	9
5	5	7	2	2	3	7	5	4	7	9	2	5	9	2	4
8	7	3	7	3	6	8	6	4	4	6	9	2	5	7	7
8	2	8	8	2	6	5	8	7	9	4	6	7	6	5	8
7	6	2	2	9	5	3	3	6	4	9	5	5	8	2	8
7	8	6	4	5	8	2	8	5	8	7	6	8	2	9	2
2	7	9	5	8	4	8	8	9	4	5	3	6	9	8	9
9	9	3	7	7	8	3	7	4	7	9	5	4	7	4	2
6	4	6	4	5	3	9	3	4	9	8	9	8	7	2	7
9	9	8	9	5	2	8	8	8	7	6	7	3	3	7	6
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2	4	9	5	8	2	9	6	3	6	7	8	4	4	5	4
9	6	9	9	2	7	3	6	9	7	5	6	8	6	7	7
6	5	8	4	8	9	3	7	8	9	9	3	3	3	9	4
3	4	6	8	9	7	8	4	7	5	2	6	9	5	2	5
7	9	9	2	4	2	4	4	3	7	5	9	6	8	4	7
2	2	8	9	6	9	2	5	2	6	3	5	2	3	8	6
9	7	6	6	2	6	6	4	3	4	4	2	4	5	3	6
6	2	3	3	7	3	9	7	4	5	8	9	9	6	9	8
3	9	2	8	9	5	5	9	7	4	9	7	2	2	8	9
8	5	6	4	5	7	6	6	9	9	9	2	8	6	2	4
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	6	4	7	8	2	7	8	6	7	8	7	7	2	3	5
8	5	7	3	4	6	4	6	7	4	7	5	8	7	8	7
3	8	5	8	2	3	6	3	6	8	5	8	6	9	5	6
6	7	9	5	5	8	9	8	3	3	8	7	5	4	7	8
4	7	6	3	9	3	7	4	9	3	9	2	6	4	9	6
7	4	8	6	7	9	8	5	6	7	2	8	5	6	4	3
6	9	5	6	5	9	3	7	8	5	6	9	3	6	4	3
5	8	8	7	9	5	4	4	2	7	9	2	5	3	8	7
9	3	3	6	2	2	5	9	4	8	4	6	7	5	9	5
6	6	2	9	3	5	4	3	7	5	3	8	7	8	6	4
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TEST B.

Write the missing numbers.

25=.....4s and.....remainder.
60=.....7s " ..... "
38=.....5s " ..... "
52=.....8s " ..... "
18=.....9s " ..... "
20=.....7s " ..... "
45=.....6s " ..... "
50=.....9s " ..... "
etc., etc.

49=.....6s and.....remainder.
33=.....4s " ..... "
55=.....7s " ..... "
61=.....6s " ..... "
40=.....5s " ..... "
72=.....8s " ..... "
77=.....9s " ..... "
19=.....3s " ..... "

The Courtis tests need supplementing perhaps more in the case of common fractions and denominate numbers and in the simpler processes of short division and short multiplication with integers than elsewhere. I will state certain general principles that should guide anyone in making up tests to supplement the Courtis test, and then give samples of some tests that are likely to be thus useful. These samples, I regret to say, have had to be devised hastily, and I do not propose them as at all "standard" or final. They can almost surely be improved in many ways, but they are perhaps as good as the average teacher would devise in the time at his disposal, and their publication at this time may economize the time of many individuals and permit interesting comparisons between classes and schools.

First, as to the general principles. The main principles governing the selection of a test are: first, that it should measure something impor-

tant; second, that we should know just what it does measure; and third, that the time of everybody concerned should be economized. The ordinary "examination" of a school pretty certainly measures something important, but it is often difficult to tell just exactly what it *does* measure, and the correction of such general examination papers takes much time; moreover, the results are not easily expressed as a single numerical score on a scale running from zero up to some maximum achievement per unit of time. The test gotten up just for a test, on the other hand, although easy to operate and giving an unambiguous score, often fails to measure the matters of greatest importance. Some sacrifice of importance to definiteness, ease of scoring and comparability of results probably must be made. We may compromise between these different desiderata by not trying to do too much and by doing the same kind of thing in each special section of a series of tests. For example, if the general omnibus examination is broken up into ten divisions of four minutes each and some one special thing measured in each division, the examination loses little as an important picture of all-around ability in arithmetic and gains a great deal in ease of scoring, comparability of results and definiteness of meaning. Or, still better, if we had 100 satisfactory tests of 100 special features of arithmetic, the man making up an examination could choose from these tried and standard tests the ten or fifteen that he needed for his special examination.

The construction of any single test may follow one of two plans. It may include work of approximately the same difficulty, measuring the person by measuring how much he does of this work within the unit of time and how well he does it. The addition test and the division test as shown above, and the Courtis tests are in general on this basis. Or the test may be a *"step-up"* test, beginning with a very easy task, going to one a little harder, then to one a little harder and so on, measuring a person by the *degree of difficulty of the problem that he can just do.* For example, suppose we had as a test the following:

MULTIPLICATION.

1.	2.	3.	4.	5.	6.
3×2	274	396	409	29.416	$.009\frac{3}{8}\times6.2$ 4-9
	4	213	860	.03007	

and scored an individual by the hardest one of the six that he could do in 5 minutes or less.

The step-up test is theoretically the better form of test, in my opinion, but the scoring of an individual in such a test becomes a very delicate matter. The individual who fails on problem of difficulty 4 will sometimes succeed with problem of difficulty 5 or 6, and it is found that to get the full value of the measure it is necessary to score how long he takes and how well he does with *each of several steps of the scale.* This, of course, makes the scoring troublesome. In administering the test also, each separate grade of difficulty has to be tested by itself, and this requires a good deal of time. Further, for comparisons of different children within the

same grade or of different classes, all of the same grade who have covered presumably the same portions of the course of study in arithmetic, tests of the relative facility in doing the same kind of thing are more instructive than tests of the degree of difficulty of the thing that can just barely be done.

The tests which will be given here as samples will not be "step-up" tests, but will be roughly scorable by the total amount done in a unit of time and the precision with which it is done. The main administrative problems with such tests concern the time limit to be set, the degree of emphasis to be placed upon speed and upon accuracy in the instructions to the pupil, and in the score given to the result. All tests should be given with a time limit, the time being preferably such that the most gifted pupil cannot quite complete the test. The reason for this is that otherwise the best pupils in the class are not measured, or are measured, only in the sense that we might measure a man six feet and seven inches tall by saying that he was at least six feet tall.

The best practical method of controlling the relation between speed and accuracy is, in my opinion, to announce to the class beforehand the system of scoring that will be followed. For example, in the column-addition test quoted above, if we announce that the score will be "*One*" for every column added correctly and "One-half" for every column added, but with a wrong answer, we shall get one result from our pupils. If we announce, on the other hand, that the score will be "*One*" for every column added correctly and nothing whatever for a column whose answer is wrong, we shall get a different result. If we announce that the score will be "One" for every column added correctly, with not only no credit at all *but with a subtraction of "One"* for every column with a wrong answer, we shall get more effort for precision. This automatic control of the relation of speed and precision through the announcement of the score permits us to use the same test as a test for speed and for accuracy. We can for any pupil get his accuracy at any given speed—from the speed at which he adds perfectly up to the highest speed at which he really can be said to add at all. In the following sample tests to be used as supplements to the Courtis tests certain suggestions as to time and scoring are made, but these may be altered to suit special needs. The time suggested here is for the tests as speed tests. If the test is given with the announcement that no credit whatever will be given for any answer that is wrong, the time announced here may safely be somewhat increased; and if the student understands that he is to be penalized for errors to a further extent still, the time may be increased still further.

In my opinion all tests in arithmetic should be freed so far as possible from the factor of speed of writing numbers and from the factor of errors in copying numbers. This means that in tests of computation the pupil should write only the answers, the material itself being furnished him in clear print or other suitable form for use without copying. Special tests for precision in copying figures from the book or from the blackboard should be given. Errors in copying are important, but they are hardly the result of mathematical inability and should be treated separately from it.

Test C.

Write in figures:

A. Three thousand eight hundred seventy-two. Five thousand sixty-nine. Seven thousand five hundred eight. Four thousand six hundred three. Eight thousand five hundred sixty. Two thousand thirty-five. Three thousand six hundred. Seven thousand six. Eight thousand fifty. Eight thousand seven hundred fifty.

Time, as speed test, 60 seconds.

Score as speed test, 1 for every figure correct, 0 for every figure wrong.

Score as accuracy test, 1 for every figure correct, 1 or 2 or 3 off for every figure wrong.

Test D.

Write the missing numbers:

½ of 6 =	⅓ of 27 =	⅕ of 35 =	⅛ of 40 =	⅙ of 54 =
½ of 10 =	½ of 18 =	⅕ of 30 =	1/7 of 28 =	⅙ of 36 =
½ of 8 =	⅓ of 18 =	⅙ of 30 =	1/7 of 49 =	⅙ of 24 =
⅓ of 12 =	⅙ of 12 =	⅓ of 21 =	1/7 of 42 =	⅓ of 24 =
⅓ of 15 =	½ of 16 =	⅛ of 32 =	⅙ of 42 =	⅛ of 24 =
¼ of 8 =	½ of 14 =	⅛ of 16 =	⅕ of 45 =	¼ of 24 =
¼ of 40 =	1/9 of 18 =	⅛ of 48 =	⅕ of 15 =	⅛ of 72 =
⅕ of 40 =	¼ of 36 =	⅙ of 48 =	⅕ of 10 =	⅛ of 64 =
⅙ of 18 =	¼ of 32 =	⅙ of 60 =	⅓ of 15 =	⅓ of 30 =
⅛ of 56 =	1/7 of 35 =	¼ of 28 =	⅓ of 9 =	1/9 of 36 =

Time as speed test, 60 seconds.

Score as speed test, 1 for each right answer, 0 for each wrong answer.

Score as accuracy test, 1 for each right answer, 1 or 2 or 3 off for each wrong answer.

Test E.

ADDITION.

Write the sums:

74	160	208	100	94	20	106
139	134	32	199	30	123	102
249	149	94	194	20	132	119
156	165	47	295	46	198	103
178	367	95	156	74	147	468
18	105	404	100	89	17	36
66	120	26	33	57	68	59
29	125	143	45	96	248	17
57	132	39	200	74	75	68
87	108	132	46	35	226	24
150	48	54	56	90	64	
175	96	42	88	225	112	
225	36	30	108	135	48	
100	72	48	150	45	176	
150	60	18	125	120	256	

Time, 120 seconds.

Score as speed test, 2 for every right figure, 1 for every wrong figure.

Score as accuracy test, 2 for every right figure, 1 or 2 or 3 off for every wrong figure.

TEST F.

Write the differences (or "subtract"):

A.					
	712	694	834	500	283
	478	329	271	225	126
	545	308	546	647	472
	245	104	238	87	103
	200	642	735	759	250
	87	476	300	587	106
	700	496	211	877	874
	129	178	139	292	495

Time as speed test, 60 seconds.

Score as speed test, 2 for every figure right, 1 for every figure wrong.

Score as accuracy test, 2 for every figure right, 1 or 2 or 3 off for every figure wrong.

TEST G.

Write the products:

254	328	224	704	163
6	5	9	3	5
473	520	308	756	519
7	8	3	9	8
885	503	900	235	157
6	8	6	9	8
260	703	174	296	280
6	8	9	4	9

Time as speed test, 60 seconds.

Score as speed test, 2 for every right figure, 1 for every wrong figure.

Score as accuracy test, 2 for every right figure, 1 or 2 or 3 off for every wrong figure.

TEST H—*Division.*

All of the examples in these two rows have remainders in the answers:

4)9,427	3)8,356	3)1,904	6)4,729
7)9,181	6)3,500	8)2,009	5)2,174

None of the examples in these two rows have remainders in the answers:

9)8,343	8)1,040	2)8,650	7)5,887
6)4,410	5)7,485	4)1,500	8)6,008

Some of the examples in these two rows have remainders in the answers; some do not.

9)9,068	9)1,143	5)3,795	8)1,000
5)9,867	4)6,275	3)7,000	7)1,988

Time as speed test, 120 seconds. Score as speed test, 2 for each figure right (counting both figures in a remainder), and 1 for each figure wrong. Score as accuracy test, 2 for each figure right (counting both figures in a remainder), and 1 or 2 or 3 off for each figure wrong.

TEST I.

Write the missing numbers.

9 quarts = —— pints?
7 yards = —— feet?
24 feet = —— yards?
8 gallons = —— quarts?
16 quarts = —— gallons?
5 bushels = —— pecks?
4 square yards = ——square feet?
28 days = —— weeks?
6 pecks = —— quarts?
1 bushel = —— quarts?
Half a foot = —— inches?
Two feet = —— inches?
Half a pound = —— ounces?
¼ of a pound = —— ounces?
⅓ of an hour = —— minutes?
⅕ of an hour = —— minutes?
14 pints = —— quarts?
1 mile = —— feet?
2 tons = —— pounds?
1 square foot = —— square inches?
1½ quarts = —— pints?
3 pints = —— gills?
8 gills = —— pints?
45 square feet = —— square yards?
6,000 pounds = —— tons?
24 quarts = —— gallons?
16 pecks = —— bushels?
⅓ of a square yard = —— feet?
2 square feet = —— square inches?
72 inches = —— feet.

Time as speed test, 60 seconds. Score as speed test, 1 for each right answer; 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 or 3 off for each wrong answer, and for each omitted answer as far as the pupil went.

TEST J.

Write the missing figures:

5/2 = 2 ?/2	6/2 = ?	4/4 = ?	11/6 = ?
8/3 = 2 ?/3	4/2 = ?	5/4 = ?	8/8 = ?
15/8 = 1 ?/8	9/3 = ?	7/4 = ?	9/8 = ?
7/4 = 1 ?/4	10/5 = ?	8/4 = ?	11/8 = ?
11/5 = 2 ?/5	8/8 = ?	3/3 = ?	15/8 = ?
9/4 = 2 ?/4	6/6 = ?	4/3 = ?	3/2 = ?
9/2 = 4 ?/2	6/3 = ?	5/3 = ?	4/2 = ?
10/3 = 3 ?/3	8/4 = ?	6/5 = ?	5/2 = ?
7/6 = 1 ?/6	4/4 = ?	7/5 = ?	5/3 = ?
9/5 = 1 ?/5	5/5 = ?	8/5 = ?	6/3 = ?
11/8 = 1 ?/8	8/2 = ?	9/5 = ?	5/4 = ?
7/3 = 2 ?/3	16/8 = ?	7/6 = ?	7/4 = ?

Time as speed test, 60 seconds. Score as speed test, 1 for each right answer, 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 off for each wrong answer.

TEST K—*Addition.*

Write the sums. Write them in lowest terms.

4½	¼	4⅜	2⅙	3¼	¾	2⅛	1⅚
3	1/12	1⅜	4⅙	2¼	¾	1⅞	1½
2 1/12	¼	3⅛	1½	2⅝	⅜	2⅞	1⅙
	½	⅚	1⅙	1¼	4⅓	⅙	
1⅓	5/12	1⅙	2⅓	⅙	3⅔	5/12	3½
7¾	¼	½	1⅙	2 1/12	1⅓	¼	7 1/12

Time as speed test, 60 seconds. Score as speed test, 2 for each right answer, 1 for each wrong answer. Score as accuracy test, 2 for each right answer, 1 or 2 or 3 off for each wrong answer.

TEST L—*Subtraction.*

⅞	5⅞	4⅘	1⅘	2¾	7¼	46¾	5⅖	48¼	7½
⅜	1⅛	1⅖	⅖	1¾	2	33¾	1⅕	21	2
3½	12⅜	9⅞	1⅗	62½	4⅝	45⅜	5⅚	11⅞	7⅖
1½	7⅛	2⅜	1	37½	3⅝	33⅕	4⅙	9⅛	3⅖
⅞	5⅓	8⅕	6½	227⅔	2¾	296⅝	1⅔	7⅘	⅝
2/8	2⅓	3	6	109	¾	125	1⅓	2⅘	⅜

Time as speed test, 60 seconds. Score as speed test, 1 for every answer right, 0 for every answer wrong. Score as accuracy test, 1 for every answer right, 1 or 2 or 3 off for every answer wrong.

TEST M—*Addition.*

Find the sums. Express your results in lowest terms.

⅖	¼	5 2/9	⅜	⅛	1⅖	⅙	2 5/9
1/7	⅙	3⅙	⅙	⅓	4⅚	⅙	1⅚
				¼	⅓	1/12	⅔
3/16	4⅛	⅕	2⅙	⅙	⅚	⅚	⅙
⅞	5/16	4/7	⅜	⅜	⅝	⅜	4/9

Subtraction.

Find the differences. Express your results in lowest terms.

8 4/15	9⅙	5⅚	19 5/7	2 11/18	⅞	13⅛	1½
4 2/15	2¾	1¼	4⅕	1⅔	⅓	10⅚	⅔
11/16	4 1/7	⅚	⅞	5½	3¼	27⅙	5/16
¼	2⅘	2/9	⅙	2⅘	2⅓	13⅕	⅛

Time as speed test, 120 seconds. Score as speed test, 2 for each right answer, 1 for each wrong answer. Score as accuracy test, 2 for each right answer, 1 or 2 or 3 off for each wrong answer.

Test N.

Write the missing numbers:

$\frac{1}{2} = 3/?$	$\frac{1}{3} = 3/?$	$\frac{1}{4} = 3/?$	$\frac{2}{3} = 6/?$	$\frac{3}{5} = ?/10$
$\frac{1}{3} = 4/?$	$\frac{3}{4} = ?/8$	$\frac{1}{8} = ?/24$	$\frac{3}{4} = ?/16$	$\frac{3}{4} = ?/32$
$\frac{1}{4} = ?/8$	$\frac{5}{8} = ?/32$	$\frac{1}{2} = ?/12$	$\frac{1}{2} = 5/?$	$\frac{3}{8} = 9/?$
$\frac{1}{5} = ?/15$	$\frac{5}{8} = ?/16$	$\frac{1}{3} = ?/30$	$\frac{2}{5} = 10/?$	$\frac{1}{3} = 4/?$
$\frac{1}{6} = 2/?$	$\frac{1}{8} = 2/?$	$\frac{3}{4} = 9/?$	$\frac{5}{6} = ?/24$	$\frac{2}{3} = ?/12$
$\frac{2}{3} = ?/6$	$\frac{5}{6} = 15/?$	$\frac{1}{5} = ?/30$	$\frac{1}{6} = ?/30$	$\frac{1}{2} = 9/?$
$\frac{3}{4} = 12/?$	$\frac{2}{3} = ?/18$	$\frac{2}{3} = 4/?$	$\frac{4}{5} = ?/20$	$\frac{4}{5} = ?/10$
$\frac{2}{5} = 4/?$	$\frac{3}{8} = ?/16$	$\frac{3}{4} = ?/24$	$\frac{2}{3} = ?/15$	$\frac{2}{3} = ?/18$

Time as speed test, 120 seconds. Score as speed test, 1 for each right answer, 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 or 3 off for each wrong answer.

Test O.

Reduce to lowest terms. If the fraction is in lowest terms already, write l. t. after it.

$\frac{7}{8}$	$\frac{6}{8}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{3}{12}$	$\frac{4}{12}$
$\frac{5}{10}$	$\frac{5}{12}$	$\frac{36}{42}$	$\frac{8}{32}$	$\frac{28}{32}$	$\frac{10}{25}$
$\frac{15}{16}$	$\frac{9}{15}$	$\frac{11}{25}$	$\frac{21}{24}$	$\frac{17}{24}$	$\frac{20}{36}$
$\frac{11}{29}$	$\frac{7}{27}$	$\frac{20}{24}$	$\frac{16}{22}$	$\frac{12}{39}$	$\frac{20}{38}$
$\frac{14}{33}$	$\frac{15}{34}$	$\frac{16}{24}$	$\frac{8}{26}$	$\frac{15}{21}$	$\frac{12}{30}$
$\frac{11}{27}$	$\frac{10}{27}$	$\frac{18}{28}$	$\frac{6}{16}$	$\frac{8}{18}$	$\frac{15}{23}$

Time for speed test, 120 seconds. Score for speed test, 1 for each right answer, 0 for each wrong answer. Score for accuracy test, 1 for each right answer, 1 or 2 off for each wrong answer.

TEST P—*Multiplication.*

Find the products:

18 × 2½ =	16 × 2¾ =	12 × 2¼ =	15 × 7¼ =	20 × 8¾ =	20 × 1⅜ =	24 × 1⅛ =	50 × 2⅛ =
11 × 4¾ =	32 × 4¼ =	17 × 4½ =	25 × 6½ =	28 × 6¾ =	19 × 7¼ =	18 × 9½ =	13 × 9¾ =
19 × 3¼ =	25 × 3¾ =	20 × 3½ =	15 × 5¾ =	24 × 5¼ =	15 × 5½ =	98 × 1½ =	80 × 1¾ =
30 × 6¾ =	22 × 6½ =	60 × 5¾ =	48 × 2¼ =	25 × 3½ =	16 × 4¾ =	30 × 4½ =	20 × 4¼ =

Time as speed test, 120 seconds. Score as speed test, 1 for each right figure in each answer, 0 for each wrong figure. Score as accuracy test, 1 for each right figure, 1 or 2 off for each wrong figure.

TEST Q—*Multiplication.*

Find the products:

$\frac{16}{25} \times \frac{15}{32}$	$\frac{3}{7} \times \frac{4}{9}$	$\frac{9}{20} \times \frac{10}{18}$	$\frac{2}{3} \times \frac{1}{4}$
$\frac{4}{5} \times \frac{3}{4}$	$\frac{5}{6} \times \frac{3}{4}$	$\frac{14}{27} \times \frac{9}{10}$	$\frac{24}{25} \times \frac{11}{12}$
$\frac{5}{16} \times \frac{8}{15}$	$\frac{1}{2} \times \frac{3}{4}$	$\frac{3}{8} \times \frac{1}{2}$	$\frac{1}{8} \times \frac{2}{3}$
$\frac{3}{4} \times \frac{3}{8}$	$\frac{1}{5} \times \frac{1}{6}$	$\frac{3}{8} \times \frac{2}{3}$	$\frac{7}{2} \times \frac{2}{9}$
$\frac{2}{3} \times \frac{5}{8}$	$\frac{1}{2} \times \frac{6}{5}$	$\frac{1}{4} \times \frac{1}{3}$	$\frac{3}{8} \times \frac{3}{2}$

Time as speed test, 120 seconds. Score as speed test, 1 for each right answer, 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 for each wrong answer.

TEST R—*Division.*

$\frac{7}{16} \div \frac{3}{8} =$	$\frac{2}{3} \div \frac{2}{-} =$	$\frac{5}{6} \div \frac{5}{12} =$
$\frac{13}{5} \div \frac{2}{5} =$	$\frac{11}{12} \div \frac{1}{4} =$	$\frac{8}{5} \div \frac{4}{5} =$
$\frac{1}{2} \div \frac{5}{6} =$	$\frac{1}{4} \div \frac{5}{8} =$	$\frac{2}{5} \div \frac{7}{8} =$
$\frac{4}{5} \div \frac{5}{-} =$	$\frac{2}{3} \div \frac{1}{3} =$	$\frac{4}{-} \div \frac{2}{5} =$

Time as speed test, 120 seconds. Score as speed test, 1 for each right answer, 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 off for each wrong answer.

TEST S—*Addition.*

Write the sums:

21 lb. 10 oz.	6 ft. 9 in.	6 mo. 14 da.	3 mi. 80 rd.	9 wk. 2 da.
15 lb. 14 oz.	4 ft. 2 in.	2 mo. 20 da.	1 mi. 300 rd.	6 wk. 5 da.
3 lb. 4 oz.	12 ft. 7 in.	4 mo. 2 da.	1 mi. 70 rd.	3 wk. 5 da.
2 lb. 12 oz.	9 ft. 9 in.	6 mo. 15 da.	268 rd.	1 wk. 1 da.
6 lb. 10 oz.	14 ft. 6 in.	3 mo. 21 da.	5 mi. 90 rd.	6 wk. 6 da.
6 lb. 11 oz.	21 ft. 9 in.	3 mo. 16 da.	3 mi. 70 rd.	8 wk. 6 da.
5 lb. 14 oz.	13 ft. 4 in.	3 mo. 27 da.	4 mi. 230 rd.	2 wk. 6 da.
7 qt. 1 pt.	2 bu. 1 pk.	2 yr. 5 mo.	5 yr. 3 mo.	1 mi. 2,164 ft.
8 qt. 1 pt.	1 bu. 3 pk.	3 yr. 6 mo.	7 yr. 1 mo.	2 mi. 326 ft.
6 qt. 1 pt.	2 bu. 2 pk.	4 yr. 9 mo.	2 yr.	1 mi. 2,703 ft.
9 qt.	3 bu.	3 yr. 2 mo.	4 yr. 2 mo.	2 mi. 114 ft.
7 qt. 1 pt.	1 bu. 3 pk.	3 yr. 7 mo.	6 yr. 9 mo.	1 mi. 1,314 ft.

Time as speed test, 120 seconds. Score as speed test, 1 for each right element in each answer, 0 for each wrong element. Score as accuracy test, 1 for each right element, 1 or 2 off for each wrong element.

Test T—*Subtraction.*

Write the differences:

4 yd. 1 ft. 6 in.	7 ft. 3 in.	5 yd. 1 ft. 4 in.	3 yd. 20 in.	4 lb. 9 oz.
2 yd. 2 ft. 3 in.	2 ft. 9 in.	2 yd. 2 ft. 8 in.	1 yd. 6 in.	2 lb. 15 oz.

2 mi. 140 rd.	2 mi.	9 rd. 7 ft.	6 lb. 2 oz.
270	3,240 ft.	3 rd. 9 ft.	4 lb. 14 oz.

1,915 yr. 4 mo. 7 da.	1,912 yr. 6 mo. 8 da.	1,911 yr. 6 mo. 3 da.
1,909 yr. 2 mo. 21 da.	1,910 yr. 7 mo. 15 da.	1,910 yr. 8 mo. 28 da.

Time as speed test, 60 or 120 seconds. Score as speed test, 1 for each right element in each answer, 0 for each wrong element. Score as accuracy test, 1 for each right element, 1 or 2 off for each wrong element.

Test U.

Write the missing numbers:

12 gallons = —— quarts?
9 quarts = —— pints?
¼ gallon = —— quarts?
9 quarts = —— gallons?
16 pints = —— quarts?
2½ gallons = —— quarts?
3 pecks = —— quarts?
2½ pecks = —— quarts?
½ bushel = —— pecks?
16 quarts = —— pecks?
12 pecks = —— bushels?
2⅓ feet = —— inches?
4 feet = —— yards?
1 rod = —— feet?
¾ pound = —— ounces?
4 square yards = —— square feet?
27 square feet = —— square yards?
2 cubic yards = —— cubic feet?
1,280 acres = —— square miles?
4 gallons = —— pints?
2 bushels = —— quarts?
3 yards = —— inches?
20 pints = —— gallons?
1 gallon = —— gills?
1 cubic foot = cubic inches?
2 sq. miles = —— acres?
2 rods = —— yards?
3 tons = —— pounds?
20 ounces = —— pounds?
2 square feet = —— square inches?

Time as speed test, 60 seconds. Score as speed test, 1 for each right answer, 0 for each wrong answer. Score as accuracy test, 1 for each right answer, 1 or 2 off for each wrong answer.

Teaching Reading

By James L. Hughes, LL.D., Chief Inspector of Schools, Toronto.

Reading does not mean reading aloud. Reading is the process of getting thought out of visible language. Reading aloud is a process by which we express orally the thoughts of other people in the language of the authors. Nearly all the evils resulting from poor methods of teaching reading are caused by failure to understand clearly the distinction between reading and reading aloud.

There are two reasons that led teachers long ago to believe that the power of reading should be learned by the process of reading aloud:—

(1) That the teacher must hear the child read in order to know whether he understands or does not understand what he reads.

(2) Teachers believed that they could develop the pupil's power to express his own thoughts orally by training him to express orally the thoughts of other people.

These reasons have no true psychological basis. The first rests on the assumption that the teacher can tell whether a child understands what he is reading by hearing him read aloud. Most children can read new matter with fairly good expression without having clear conceptions of what they have read. The only possible way to know whether a child understands what he reads is to let him tell in his own language his conception of the meaning of what he has read.

The second reason is based on the assumption that expression leads to self-expression. All modern psychology teaches that self-expression is the true way to develop the power of expression in any department of human power, and that expression does not really develop self-expression. I asked Dr. W. T. Harris twenty-two years ago to give me any reason to justify the teaching of oral reading in the schools. He admitted at once that more time was wasted on oral reading than on any other subject; that the results achieved were usually very imperfect; that the influence of oral reading on the general development of power or character was very slight; and that it weakened self-expression instead of developing it. He said, however, that "he must hear the child read to know how fully he understood what he read." I gave the reply given to reason number one above, and Dr. Harris at once very definitely agreed with me.

The powers of oral self-expression should be developed in school, but not in connection with reading. Expression can never lead to the highest self-expression. On the other hand, self-expression is the only way to develop the highest power of expression.

Reading is of value because it makes available to us the stores of knowledge, and the great ideals recorded in books. Reading is a process of thought getting. The old law was:

> "Learn to read slow, all other graces
> Will follow in their proper places."

The new law is directly opposed to this. There are only two general laws

necessary for the guidance of the teacher in teaching reading: (1) Train the pupils to get thought definitely from visible language. (2) Train them to do this at the highest possible rate of speed. Some will say these laws are not in harmony. They are in perfect harmony. The child's mind should be trained to act definitely, and as quickly as possible. All minds cannot be trained to act at the same rate, but each mind should act at its best rate. The teacher who aids a boy to double his rate of reading without reducing the definiteness of his power of thought getting has doubled the boy's capacity for acquiring new ideals and new facts from books. Most teachers yet underestimate the developing power of the child's mind. With proper training processes, rapidity and definiteness are partners in securing the best mental development.

Most systems, especially modern systems of teaching reading, attempt to teach reading in the way the child learned to speak. The authors say "The logical sequence in learning oral language is: first, the object; second, the idea; third, the word; therefore the same order should be followed in learning to read written language." There is no psychological parallel between learning to use oral language and learning to recognize visible language.

(1) Oral languages is a new language to the child, when he is learning to use it. Visible language is not a new language to him. Reading is a process by which he is trained to recognize in visible form a language which he already recognizes and understands when he hears it spoken.

(2) The conceptions expressed by the child when he is learning to speak are new to him. The conceptions of visible language when he is learning to read are not new. They cannot be new. When children are learning to read no teacher gives them any words they do not understand to read. Thought and language must both be familiar to the child before he can recognize them in visible form. In learning to read there is not new thought to require new language, so the new form of language cannot be learned as oral language was learned in direct connection with the association of new words with the revelation of new thought by new objects and experiences.

Learning to read is not a means of enlarging a child's vocabulary. Reading will enlarge his vocabulary, but no thinking teacher believes that *learning to read* should or can do so. The pupil should have language lessons regularly. The only lesson that should not be made a language lesson to a certain extent in primary schools is the reading lesson. In the reading lesson the child is not learning a new language, but learning to recognize through his eye language which he has already learned through his ear.

(3) Oral language is natural; visible language is artificial. All children who can hear, speak without training. They learn to speak correctly just as easily as to speak incorrectly, if they hear only correct speaking. Oral language, being natural, is learned without conscious effort. Visible language, being artificial, has to be learned by conscious effort.

(4) In using oral language, thought suggests words; in reading, words suggest thought. In oral language, the idea must precede the word;

in reading, the word must precede the idea. Oral language is a means of expressing thought; reading is a process of obtaining thought. As the clearest conceptions come to the child's mind from real things, the natural order in learning to speak is object, idea, word. All these conditions are reversed in learning to read, so there is no psychological parallel between learning to speak a language and learning to read the same language in visible form.

In reading, the idea is conceived through the word, not the word from the idea, so we should begin with the word and not with the idea in learning to read. Reading should never be confounded with learning to read, but even in reading we must understand the author's words before we can understand his ideals, or his principles. The process of reading intelligently consists in looking at words and recognizing through them the mental pictures they represent. This is true of single words, of sentences, of chapters, and of books. The only logical order of reading is from words to the thoughts, and any system that reverses this order retards the progress of the child in learning to read.

(5) Teachers should most carefully avoid the possibility of suggesting the word by the thing it represents. The child has to deal solely with visible words in reading, and not with objects, nor with oral language used by his teacher to suggest words or ideas, and therefore the duty of the teacher is to give the child automatic power to recognize words without conscious effort as early as possible. A child can read well who can extract thought automatically, definitely and rapidly from printed matter. So long as any part of his attention has to be given consciously to the recognition of words, he cannot give his whole mind to the recognition of the new thought and to relating it to the thought already in his mind.

The power to recognize words automatically should be developed as all power should be developed, by repetition of the necessary operative processes, slowly and consciously at first, but with increasing repidity until it becomes free and automatic. Reading is not a means of obtaining thought from things. Reading is not the recognition of words suggested by objects or by any other way of suggesting thought. Reading is a process of recognizing words by their own forms and construction. The recognition of the word is the first step and not the last step in reading. To use any plan for suggesting the word through the idea reverses the true, essential order of reading, and must retard the mastery of the reading process. It retards the immediate and the ultimate progress of the child.

(6) Writers frequently attempt to prove that their methods of teaching reading are correct by saying: "It is absolutely necessary to have a direct and strong bond of association between the idea and the word which represents it in order to make the reading lesson vital." This statement is correct, but it does not prove that pupils should learn to read language as they learned to speak it. "This strong and direct bond of association between ideas and words" was formed when the child learned to speak. He cannot read intelligently, either silently or aloud, language which he does not speak intelligently. He should not be allowed to try to do so. His spoken

language corresponds with his ideas, and when he hears it used it recalls these ideas to his mind.

The child begins the process of learning to read with a very large number of conceptions, which are expressed by him and to him in his spoken language by corresponding words. Each conception instantly suggests its representative word when he is speaking; each spoken word suggests its corresponding idea when some one else is speaking to him.

The following is a logical sequence:—

(1) The object—cap.
(2) The idea—cap.
(3) The spoken word—cap.
(4) The visible word—cap.

The bond of "direct and logical association" was established long before the child went to school. Logically the first two are one so far as reading is concerned. Any one of the first three steps instantly recalls the other two to the child without conscious effort on his part.

In teaching the child to read, the only question the teacher has to decide is with which of the first steps can the visible word be most easily, most naturally, and most philosophically, associated? We can have no difficulty in reaching a decision. There is no "direct and logical association" between the shape of a cap and the visible word "cap." No relationship whatever exists, or was intended to exist by those who planned visible language. The method adopted to make language visible is based on the plan of representing the individual sounds of spoken language by corresponding visible signs. It was with this manifest purpose that alphabets were first constructed.

Visible language is therefore directly and philosophically related to spoken language, and as soon as the relationships between the corresponding elements of the two forms of language have been definitely established in the child's mind, the spoken form becomes convertible into the visible form and the visible form into the spoken form by a regular and logical process, that at first has to be performed slowly by conscious effort, but which soon becomes automatic and rapid. On the other hand, the association of the visible word directly with the object or the idea is necessarily an arbitrary process which must remain an arbitrary process with no logical basis. A great many plans have been adopted to simplify this arbitrary process and to make it appear natural, but its natural deformity cannot be concealed. It remains an illogical process to the end.

The problem is a very simple one. The first three steps in the sequence are united in the child's mind before he goes to school. The spoken word "cap" automatically suggests the idea "cap." The problem in reading is to make the same word "cap" in its visible form recall the same idea that has been brought regularly to the child's mind by the spoken word "cap." There is but one way in which this can be done logically, easily, quickly, and by operative and not mere memory processes. By whatever way a child learns to read he can never recognize new words independently until he has learned in some way to associate the letters in the words with their proper sounds and powers. The sooner he is able to do this, the sooner he is inde-

pendent in the process of reading. By the phonic system properly taught he may be made independent in a very short time, varying according to his ability from a few days to a few weeks.

(7) Those who try to teach children to read "as they learned to speak" confound expression of thought with the recognition of forms of thought. These are not similar processes psychologically. In the *expression* of thought things and their names are mutually inter-suggestive in either spoken or written language. This is not the case in the *recognition* of visible language. In *recognition* the name recalls the object much more certainly than the object suggests the name. We look at thousands of objects every day, and even use them, without being conscious of the fact that they have names at all.

(8) To assume that names of objects, and the words representing acts and idioms, can be learned through the eye by the same processes that language is learned through the ear, is clearly an illogical assumption. Spoken language is natural. Visible language is not natural. The ear is the organ through which language is naturally acquired.

The sum of the matter is: Oral language expresses thought, reading is the recognition of thought expressed in visible form. When the child uses oral language his thought suggests his language; when he is reading, the language suggests the thought. When he begins to learn to read he has already learned his language. Reading is not a method of learning a new language, but of recognizing in a new form the child's own language that he uses orally, and it is clear therefore, that an analogy between the process of learning to speak and the process of learning to read cannot be made logically.

Suggestions for Teaching the Phonic Method.

(1) Children should not begin to read till they are eight years old. There are many things of much greater importance for them during their growth period. Men could never have so wrongfully robbed children of their childhood as they do by teaching them to read before they are eight years old if they had not been blinded by the ideal that the chief work of the schools is to communicate knowledge and to train the powers of acquiring knowledge. This ideal had been the most destructive partial truth of the ages. A bright child who has lived under proper conditions of physical and intellectual growth at home and at school till he is eight years old should learn to read anything in his own vocabulary in a month. Many do it in a week.

(2) All the steps in learning to read should be operative processes and not merely memory processes.

(3) The child should be self-active, and not merely receptive and reproductive. The child is not self-active when he is merely carrying out in detail the instructions of his teacher. In all subjects he should operate independently under the general direction of his teacher. The teacher should reveal laws and principles. Under these laws and principles the child should be free.

(4) Under no circumstances should the teacher ask the name of a letter. In no place but the schoolroom are men or women so thoughtless as to try to teach names of things. No mother ever was foolish enough to say to her child: "This is a spoon," or "This is a boot," "What is the name of this?" etc. By the time the child is three years old he knows the name of every article in his home, and around his home, without having had a single direct lesson on the name of anything. He learned the names incidentally. Names should be learned in school in the same way. The names of the letters should be used, not taught. As the parent says: "Bring me a knife," or "Put the cup on the table," so the teacher may say to a child or a class: "Make me 'h'," or point out "f," or hold up "n." The names of the letters never cause any trouble, nor does it take any time to learn them if they are spoken as the letters need to be used.

(5) The letters should be spoken about by the teacher as saying their sounds. In order to give the conception that there are two kinds of letters, it is well to speak of the vowels as girls, and of the consonants as boys. Of course the words "vowels" and consonants" should not be used. As they are introduced to the children the "boys" should be written in one color and the "girls" in another color. The teacher should say "This little girl says," or "What does this little boy say?" The children should regard the letters as little friends who are always saying things.

(6) Soon it will be found that the "girls" do not always say the same thing, and that some of the "boys" change their voice, too. The pupils themselves may be led to discover this, and also to find out that girls sometimes sing duets, as "ou", and that very often when two girls live together only one of them speaks, nearly always the first, as "oa," "ai," etc. They will find also that two boys sometimes (very rarely) speak together as "th" and "ng." None of these discoveries should be made during the early stages of the process of learning to read. For some time each letter should say one thing only.

(7) For the purpose of learning to read, it is not necessary at any time to teach all the sounds of each vowel. The short sound only should be used at first, and then the long sound. The new sound may be taught by just saying: Sometimes the "girls" say their own names. Association of ideas will do all the rest. Even the long sound may be discovered by the pupils. In the sentence, "The cup is on the table," the child who has been taught only the short sounds of the vowels would give the short sound to "a" in table, but nine out of ten children would instantly give the long sound so as to make sense.

(8) Every step in the operative processes of learning to read may be arranged as logically in a related sequence as the steps in arithmetic, or the laws in the progressive teaching of a science. In reading, as in other operative processes, the child must gain power at each step by being trained to solve problems appropriate to his stage of development. These problems should be operative process problems, not merely memory tests.

(9) Two kinds of problems may be given in learning to read: ear problems and eye problems. Ear problems are those given to the child through

his ear; eye problems are those given to the child through his eye. The universal practice of the past, even when the phonic system was used, has been to use eye problems only. The first problem should be ear problems. When the child knows the sounds of a, m, and t, it is very much better to say to him, "Write mat," than to write "mat" on the board and ask him to find for you what the word says. The first problem gives him an opportunity to do something with his hand, and an operative process is always interesting to a child. Associating the sound or power of a letter with the letter by writing it makes the association much more definite than by looking at it.

(10) There are only three steps in teaching how to read:—

(1) To reveal to the child that the words he uses are nearly all made up of two or more sounds.

(2) To teach him the letter forms corresponding to the sounds in words.

(3) To train him to combine sounds automatically.

The first step can be taken in a single lesson. Say: "Point to the boy whose name I say"—S-a-m, making the three sounds with long pauses between them. If no one can decide which boy's name you say, repeat with shorter pauses. Then give other names of boys, girls, and things, gradually lengthening the pauses. Then let the pupils in turn speak short words so slowly as to separate them into their parts to see if the rest of the class can tell the words they are saying. One lesson of a few minutes will give the necessary revelation and develop the power of analyzing short words into their elements. The pupils may be divided into pairs to practice this game. When once started they will play the game in the yard, on the way to school, and at home, until the power of saying words analytically has become automatic.

The second step takes practically no time at all. Teaching the form and power of a new letter takes but a few seconds, and the form and power are learned by using them at once. When the pupil can use s, a, and m, say, "Write sat." At once he will write sa, but when he sounds the rest of the word he looks at you and says: "I do not know what letter says that." He knows what he needs, and you show him how to make "t." Then ask him to write mat, at, tat, tam, and he has learned the form and power of the new "little boy." Using the power day by day by operative processes fixes it naturally. There should be practically no time spent in learning the forms and powers of the letters.

The third step, training to combine or unify two or more sounds, takes little time to make clear, but it takes considerable practice to make it automatic. After one lesson in analyzing words into their elements orally (step one), say I will show you the "boys" and the "girls" that say these sounds that you make, and begin with "Sam." Let each pupil say s-a-m, as in step one. Then tell them to continue to say the first sound, and say "This little boy always says that. Watch me make his picture." Let them make "s." Proceed in the same way with the girl "a" and the boy "m," and in one lesson they will learn the three letters and their powers.

When s, a, m, t, and p, have been learned, it is wise to give no more letters till the pupils are able to use these letters to do all the ear problems and all the eye problems possible with them automatically. With these five letters, nearly thirty words can be made, and with them every possible process of spelling and of reading may be taught. When the pupils can solve all the ear problems and all the eye problems that can be given with these five letters, the real work of teaching how to read has been done. All that remains to be done is to give the other letter powers, and guide the children in operative processes. Each day makes the combining process (step three) more automatic. At first the childden should sound the words given as ear problems (as in step one) in order to decide the proper letter to represent each sound. As soon as possible they should whisper the sounds, and then only think them. Very soon the whole process becomes automatic.

(11) When words with silent letters are reached, it is better at first to draw the crayon through the silent letters. They really give very little trouble.

(12) Every step in the reading process may be used as a game. Pupils may represent letters, the letters being printed large on cardboard or written with crayon on slates. The teacher says "mat," and the pupils representing m, a, and t, step out in turn from the line. "Change it to sat, Tom," and Tom sends "m" back to line and tells "s" to take his place. Each pupil may call out the letters in turn to make words given by the teacher, or they may make words of their own with the living letters for the other children to name. Games for floor work and desk work may be varied almost infinitely.

(13) Towards the close of each lesson the bright pupils should be sent to their seats in the order in which they can solve ear or eye problems. "Write stamp." The first two who write the word correctly go to their seats. A word is written on the board, and the first two or three who step out and whisper the word correctly go to their seats. When only a few are left they should receive special practice. Those who go to their seats should have work to do, of course.

(14) The teacher should have hundreds of cards with little sentences written on them for tests. These should be given out occasionally for test work in rapid, silent reading. The cards should be given out with the blank side up. At a signal they should be taken up, and at another signal placed again on the desks with the blank side up. Then each child should tell the story on his card in his own words. This should be extended to printed matter—stories or interesting information. In a single term the older pupils in a school may be used to collect hundreds of short stories of a few lines and paste them on cards after they have been approved by the teacher. Humorous stories that children should understand are the best. There is as much intellectual development in solving rapidly a good story as in solving a problem in arithmetic, and the development resulting from standing up and telling the story dramatically in the child's own language gives several kinds of power of equal if not greater importance than the development resulting from arithmetical work.

Teaching to Read Efficiently

By Calvin Victor Campbell, Commercial High School, Brooklyn.

Thorndike says: "Education is the production and prevention of changes." To teach a child to read we must bring about certain changes, we must develop certain powers he does not now possess. Colvin says: "Habit is the result of the learning process." In teaching to read, then, the child must be changed by the production or the prevention in him of certain habits. The habits which must be produced as the results of our teaching are those which make for efficiency; the habits which must be prevented are those which limit efficiency.

Rapidity and Efficiency.

Speed is an important measure of efficiency. If in a given time A can accomplish twice as much work as B, or, if A can accomplish the same work in half the time, then A is twice as efficient as B.

Nothing is more striking to the scientific student of the reading process than the range of differences between readers in their rate of speed. Romanes found a ratio of 4 : 1; Quantz and Huey found about the same. Miss Abell noted speed differences as great as 6 : 1. This means a corresponding difference in reading efficiency, as measured by speed.

But speed promotes efficiency as measured by other standards. Dr. Quantz found that the rapid reader could reproduce 25 per cent. more of the matter read than could the slow—a ratio of 5 : 4. In quality of reproduction the rapid readers were about 37 per cent. superior in their work. Speaking of the rapid reader, Dr. Quantz says: "His memory of the substance is more exact. He introduces only two-thirds as many thoughts not found in the original selections." Thus in quality of reproduction the rapid reader excels in a ratio better than 4 : 3. Combining the quantity ratio (5 : 4), the quality ratio (4 : 3), and the speed ratio named by Miss Abell (6 : 1), we get a ratio of 10 : 1. This means that even between two college students the range of reading efficiency is so great that one student may be ten times as efficient as another. Think of competing with one ten times as efficient as yourself. Think of the handicap of going through life in the 10 per cent. class as to efficiency. Yet this life-lasting handicap is what most graduates of our schools labor under at the present time.

The average graduate of our elementary schools has considerably less than 10 per cent. of his possible efficiency in reading. The subjects tested by Huey, by Quantz, and by Miss Abell were all college students. The slowest of them was, compared with many normal persons, a highly trained reader. Yet there was a range of differences of 10 : 1 among these trained readers. What must the ratio be for the ordinary "occasional reader" compared with the quickest of these college students? One of Dr. Huey's subjects was able to read an easy passage of some length at an average rate of 13.5 words per second. This means an ability to read easy matter—such as a light novel—at a rate of over two pages a minute.

And it must be remembered that *rapid reading may be developed early*. Dearborn found an eleven-year-old girl who could read faster than almost any of the college students tested.

Do not these facts open up great possibilities for seekers of efficiency? It is certain that the child can never learn to read rapidly by reading slowly. It is certain that he can never learn to read efficiently without learning to read rapidly. Rapidity in reading is both a measure and a promoter of efficiency. Rapidity, therefore, must be reckoned an ever-present need in the reading process, something to be sought first, last, and always. Let any teacher of reading set down a list of things to be desired as the result of her work. It might almost be said: Seek ye first for SPEED, and all these things shall be added unto you.

But the schools have neglected any definite attempt to develop rapidity in reading. How many teachers of reading *consciously* adopt devices in presentation calculated to develop speed? What exercises do our pupils practise to increase their rate of speed? What tests do we make to determine whether pupils are growing in power to read rapidly? How many teachers know anything about the rate at which their pupils can read?

The rate of speed in reading is an easy matter to test; it is a *direct* measure of reading power. We pay great attention to indirect and partial measures of reading efficiency. We measure carefully the quantity and the quality of the pupil's power of reproducing what he has read. We make some more or less hazy estimates of the amount of his reading. But *where is the school that measures* directly that element in reading-efficiency, which alone suffices to place a reader in the 10 per cent. or the 90 per cent. class—*the element of speed?*

Essentials of the Reading Process.

In order to train for efficiency in any process we must study the elements of that process. Reading involves two essential activities: (1) perceiving words, and (2) thinking their meaning. These two activities are the only indispensable steps in the reading process. Efficiency in reading involves efficiency in both, in quick perception and in quick thinking. Upon the development of power in these two phases of the reading process the chief efforts of our teaching must be concentrated if we desire efficiency.

Reading does not necessarily involve a motor phase. After completing the act of reading we may copy the words read, we may act out their meaning, we may say them aloud, or we may make no outward response whatever. The point is that no one motor activity is an invariable and necessary result of the reading process. This means that oral reading is merely one of several possible supplements to the real act of reading, and not an indispensable phase of that process. Hence in seeking efficiency we must direct our attention not to any mere supplement of the process, but to the fundamental activities necessarily involved in the process itself—perceiving words and thinking their meaning. For the teacher of reading who is an efficiency seeker, the first guiding principle is: *Teach the pupil to read, rather than to read aloud.*

One vital objection to making all reading result in oral reading is the fact that this reduces the speed of reading by 50 per cent. Huey found that for fast readers the ordinary rate for silent reading was an average of 9.8 words per second, for reading aloud an average of 4.7 words. The child whose reading is all oral reading never gets practice at any higher rate than half speed. This constant tacking of the vocal process on to the act of reading is like attaching an observation car of oral expression to the pupil's train of progress in reading. The only children who develop real efficiency as readers are those who drop this trailer and "hit it up" for themselves along the highway called Silent Reading. The children who get no practice except the oral practice of the schoolroom never become efficient readers. It is the children themselves who develop their own reading efficiency. They do it by practice in silent reading outside the schoolroom. The teacher, as a rule, deserves none of the credit. As soon as she catches a child reading, she generally compels him to slow up—to read aloud, so that she may follow him. No oral reading can ever get above half speed. How can practice at half speed ever develop more than 50 per cent. of efficiency?

Oral reading is half speed reading. It has been demonstrated that the rate of reading is a habit. This habit is often surprisingly regular, page after page being read with a variation of only three or four seconds. Hence, constant practice in oral reading tends to fix a habit of reading slowly. Therefore constant oral reading limits efficiency. It is a habit that should be "prevented," as Thorndike has it.

We have long recognized the fact that the habit of "going through the motions" of reading aloud—as in whispering or lip-reading—is a habit to grow out of, not to develop. These rudiments of the act of reading aloud are carefully eliminated. Why not the act itself, except in so far as it serves as a means to other ends. *Practice for efficiency in reading means practice in silent reading.* (See the article in this number by Chief Inspector Hughes of Toronto.)

The Work of the Eye in Reading.

The eye may be aptly compared to a camera swinging horizontally on a pivot. In reading, the sensitive plate of this eye-camera—the retina—will "take" only part of a line of ordinary length. Hence, the eye shifts along the line to a new focal or fixation point, and there makes a new "exposure." The eye seems to swing from beginning to end of a line in a continuous sweep, but scientific observation has proved this to be a mistake.

The work of the eye is done in a series of alternating shifts and pauses. When the eye is in motion the retina does not "take pictures." When the retina is doing its photographic work the eye is held steady; only during the eye-pauses do we really see the words we read. Thus we find that the work of the eye is really of two kinds: (1) Muscular—shifting the eyeball and then holding it steady, and (2) Retinal—photographic in character, furnishing stimulus to the brain. An increase of efficiency in either the muscular or the retinal work of the eye would mean an increase in reading efficiency.

The muscles of the eye, by mere practice and without special training, develop a marvelous degree of efficiency. The eye shifts from the end of one line to the beginning of the next in a single sweep. The average time (for skilled readers) is .041 seconds, or about 1/25 of a second. The shifting of the eye along the line to the right generally requires three to five movements per line, rarely only two, sometimes as many as seven. These movements, according to Dodge's experiments, consume only .023 second, or about 1/40 of a second. The teacher who would set out to cut down the time of eye-movements has a hopeless as well as a needless task. The muscular work of the eye shows very little "lost time."

The efficiency-hunter, however, seeks to discover not merely "lost time," but also "lost motion." We may discover how to cut down the number of eye-shifts. The eye-shift to the left or backward is a single swing through an arc of 12° to 14°; this covers a whole line. But the eye-shifts to the right, or forward, swing the eyeball through an arc varying from 2° (covering one-seventh of a line) to 7° (covering half a line). Or, to put it in another way, one reader makes only three pauses—perhaps two—in covering a line; another makes six pauses, perhaps seven, in covering the same line. Here is lost motion, surely. Suppose that one reader, A, has been trained to cover a line in three efforts, or eye-shifts, and another reader, B, has been habituated to taking six efforts to cover a line; then, so far as eye-movements are concerned, A is twice as efficient a reader as B.

The forward eye-shifts are, as has been noted, very variable in extent. They run from 2° to 7° of angular distance. But it is a curious fact that the eye takes no more time to make a 7° shift than to make a 2° shift. Huey says: "The forward shifts were found to occupy a relatively constant time, somewhat independent of their extent." Presumably, therefore, the eye uses no more effort, suffers no more strain, in sweeping over half a line than in covering only one-seventh of the line. In fact, the authorities are agreed in declaring that the small-angled or short eye-shifts are actually more fatiguing than the larger-angled or longer shifts. In other words, the reader who covers a line with three eye-shifts and eye-pauses, suffers *less* than half the eye-strain of the reader who requires six shifts.

The foregoing facts show that in teaching reading, the only way a teacher can hope to promote efficiency in the work of the eye is to reduce the number of eye-shifts per line. In this way a saving can be made as to:

(1) "Lost motions"; (2) eye-strains; (3) time required.

Now, the only way to reduce the number of eye-shifts is to reduce the number of eye-pauses. Hence the problem becomes: *How to decrease the number of eye-pauses per line.*

Eye Pauses in Reading.

When the eyeball comes to rest, the retina operates—takes a picture, so to speak. The duration of an eye-pause is always very short, although very variable. It varies (1) with the reader, (2) with the matter read. Hence a statement concerning the "*average* time" of an eye-pause is somewhat misleading. For example: One reader showed an average time per pause

of .19 second in one selection, .11 second in another. Huey puts the average for trained readers at about .185 second. It is safe to say about 1/5 of a second. Now, this is five times as long as the time for the single long eye-shift to the left, and eight times as long as the shorter eye-shifts to the right. Roughly speaking, then, over 80 per cent. of the time consumed in reading is spent in the eye-pauses, "in a fixed gaze at the page." A study of eye-pauses in reading will repay the teacher who seeks efficiency.

We shall consider (1) the space element—the extent of the "field" that may be "photographed" during an eye-pause; and (2) the time element—the factors that determine the duration of these pauses.

The Extent of the Retinal Field.

The extent of the "field," that is, "taken" at a single exposure of the "sensitive plates" of the eye—the retina—varies very greatly, with the individual and with the matter read. But one very important fact is established, and that is that the eye is like any other camera. After the eyeball comes to rest and the lens is brought to a focus on given "fixation-point" in a line of print, all within the "field" then presented is "taken" at the same time. Perhaps the most important fact established by scientific observation of the reading process is this: *In reading, the retinal picture taken during each eye-pause is a group-picture; all the words are "taken" simultaneously.*

With this in view it becomes important to learn how many letter-spaces can be taken in at a single eye-pause, in a single retinal picture. Huey says: "The reader's eye is capable of taking care of nearly half a [four-inch] line, provided the conditions are favorable." Erdmann and Dodge found that one reader read correctly sentences consisting of from four to six words of two to ten letters each, and occasionally recognized a simple word even at the end of a sentence of seven words, containing twenty-six letters. This reading was accomplished in each case in a single exposure lasting *one-tenth of a second.* Mesmer found that most of his readers could read nearly as much in certain cases. Prof. Cattell used exposures of only one hundredth of a second. It would obviously be impossible for the eye to shift to a second position in so short a time. Hence all the words seen must have been taken in simultaneously. He found one reader who could read as much as seven words, even though distributed on two lines, *provided the words composed a sentence.* So much for real efficiency in reading! It is possible to take in at one eye-pause not merely a whole word but a whole phrase, or even a whole sentence, if it comes within the "field" of the retinal camera. The eye of the pupil can take in a short sentence as a whole, in an "exposure" so brief—Cattell used 1/100 of a second—that no second motion of the eye is needed or is possible. So far as the work of the eye goes, it is possible to read a sentence at a glance, without eye-shifts.

It only remains to add that large "fields" for eye-pauses are characteristic of the most efficient readers. Hence these large "fields" are not only possible but desirable. Scientific observations of the reading process make it perfectly clear that *the teacher who seeks efficiency in reading can and must use the method of presenting reading matter in sentences,* and the

pupil must get constant practice in reading phrases and short sentences as unanalyzed wholes.

The practical question arises: How can we train the pupil to take in the largest possible "field," the greatest possible number of letters at each eye-pause? For thus he can cover a line of given length in the smallest number of pauses and eye-shifts. The answer, in general terms, is simple enough: Develop the habit; for in this, as in everything else, the establishment of the right habit, the habit which makes for efficiency, is the result of successful teaching.

Certain facts give much light on how to develop the habit of taking in large "fields," covering many letter-spaces each pause.

(1) The number of pauses does not vary greatly from line to line for the same reader.

(2) The number of pauses is about the same for lines of different lengths. Hence: *Begin with short lines on the blackboard.* Choose books with short lines. After we fix the habit of using a given number of eye-pauses for a short line, the longer line will be read with the same number of eye-shifts.

(3) Fewer pauses per line are required for familiar matter. Hence: *Use subject matter with which the pupils are familiar.* Help to establish the habit of reading with few pauses, each taking in a large field. The fewer the pauses the faster the reading.

(4) Fast reading decreases the number of pauses per line, as well as the duration of the pauses. Hence: *From the first train the pupils to read rapidly.* Speed-practice broadens the "field," and the broadening of the "field" increases speed. Speed begets speed. And speed is one measure of efficiency.

(5) Lines of varying lengths break up the forming habits of eye-fixation and eye-pause. They make eye movements uncertain and slow. The rhythm of movement should be preserved from line to line so far as possible. Hence: *Use lines of approximately the same length.* Choose books that have such lines. Avoid the book with lines of irregular length.

(6) The first fixation-point in the line does not vary more than one letter-space from line to line. In shifting from the end of one line to the beginning of the next, a habit can be established that saves time and produces accuracy of result. The eye fixates the right place each time. Hence: *Have nearly uniform beginnings for lines.* Choose books that have such beginnings. Avoid books in which the beginnings of lines are irregular, giving place to illustrations or from any other cause. The beginnings are more important than the endings.

(7) Close grammatical connection makes for a larger "field" at each eye-pause. Hence: *Use simple grammatical constructions,* especially for beginners. Avoid books that have many sentences in "inverted order," such as "A kid! a kid! my father bought," etc. What child talks or thinks in this artificial way?

(8) Parts of a sentence or a word can be grasped as unanalyzed wholes.

As such they tend to simplify the process of reading a larger whole. Hence: *Repeat frequently elements which can be grasped as unanalyzed wholes,* such as phonograms, words and phrases. Choose books which use such repeated elements, provided no other principle is violated, such as the need of sense and meaning.

(9) Nothing has been more clearly established than the fact that the "field," the number of letter-spaces, taken in at an eye-pause is greatly broadened when the letters presented form words, when the words form sentences, when the sentences have a meaning for the child. *Use sentences that mean something to the child.* Reading matter that appeals to the child helps his eye to acquire the habit of taking in at each pause a large field covering many letter-spaces. Words and sentences which serve no other purpose than to drag in examples of particular sounds or phonograms, prevent instead of promote the development of efficiency in reading. Such sentences as: "Fill the can at the rill," etc., are not reading matter to a child. He cannot truly *read* such a sentence. "Reading is thinking," and such sentences have no meaning, produce no thinking in his mind. Many sentences to be found in primers are admirably designed to prevent the development of real reading; that is, of thinking. Their use develops the pernicious habit of looking at words without getting or expecting to get any sense out of them. After speaking of the "inanity and disjointedness of the reading content" of most primers, Huey says: "How a child could talk such stuff naturally is beyond comprehension, and reading it can scarcely help developing that drawling, wooden monotone so generally found in reading classes."

(10) The chief means of increasing the number of letter-spaces taken in at an eye-pause is practice. But this practice must be on word-groups as wholes. It is impossible to take in a large field by practising on a small one. Word-groups must be presented as wholes in such a way that it is impossible for the pupil to analyze them or to perceive them except as wholes. (How this can be done will be discussed later.) Only when the pupil is trained to perceive word-groups as analyzed wholes can he ever learn to read rapidly or efficiently. The word-group, as a whole, is the symbol of a thought as a whole. The purpose of the symbols of thought is to produce thought, not to arouse a consciousness of themselves. Words, as such, must not be allowed to thrust themselves into the reader's mind. The mental process produced by looking at words must not be perceiving words, but thinking meanings. Words must function in the reader's mind not as words, but as thoughts. *The truly efficient reader looks at words, but he does not see words; he thinks meanings.*

Duration of Eye-Pauses.

The duration of an eye-pause in reading varies within wide limits, both for the individual and for various kinds of reading material. For a trained reader an eye-pause lasts less than one-fifth of a second, on the average. Most of this very brief time is consumed by the thinking process; the physiological apparatus of sight works with extraordinary rapidity. We

shall note, first, the length of time the reading matter must be exposed to the retina in order to be read.

The eye is a very "rapid" camera. Mesmer found that, after practice, all his readers could recognize words exposed for two thousandths of a second (.002 second). Prof. Cattell, working with exposures of one hundredth of a second (.01 second), found that the time needed for recognizing long words was but one-thousandth of a second (.001 second) more than for short words or single letters. Erdmann and Dodge found that one of their subjects could read sentences of four to six words of two to ten letters each, and was able to recognize a simple word at the end of a sentence containing seven words and twenty-six letters, while working with an exposure of *one-tenth of a second.* Mesmer found that most of his readers could read nearly as much as this with the same exposure.

Now what bearing has this on the teaching of primary reading? Does it not show clearly that it is not necessary for a child to gaze at a word or sentence for five, ten, twenty seconds in order to see it long enough to recognize what he sees? The eye of the adult does not require any such length of time. There is every reason to believe that the retinal "camera" of a child is quite as rapid as that of an adult. The adult eye can take in as much as twenty-six letters in one-tenth of a second.

Let us not confuse the time of exposure with the time for getting the thought. The former question is a matter of physiology; the latter a matter of mental activity. What we are trying to get at is this: *How long must a word or a short sentence be held before the retina of the child's eye to be read?* Not to speak of the incredibly short time of "exposure" that Mesmer found necessary (.002 second), consider the fact that all of Cattell's subjects found one-hundredth of a second (.01 second) sufficient to recognize long words. There is no good reason to believe that the retina camera of the child requires an exposure of ten seconds—one thousand times as long. The length of time for which it is really necessary to "expose" reading matter to the retina of the child is exceedingly short.

But an exceedingly brief exposure is not merely possible; it is more effective. Quantz found that an exposure of one second gave better results than an exposure of two seconds, an exposure of half a second better results than one of one second. It was found by Cattell, by Goldscheider and Mueller, by Quantz, and by various other experimenters, that when printed matter was exposed to the eye for a very short time, *about one-hundredth of a second,* more could be read, or, the same amount could be read more easily than when the exposure was longer.

Psychology as well as physiology demands that the exposure of reading matter be brief. The reason lies in the rapid fluctuating of the child's attention. Even though the words are before the child, he cannot attend to them long at a time.

Attention moves in pulses or waves. It is no more a steady and continuous process than the contracting of the heart. The heart must relax after each effort. So attention, moving in waves, shows, now a crest of maximum attention, then a trough of relative inattention. It has been ex-

perimentally proved that, even in the case of the trained adult, *attention cannot be kept at the maximum for longer than two or three seconds.* Then attention slackens, until it receives a fresh impulse. The length of time a child can give the maximum of attention is even less than for adults. The only way a child can even apparently continue to attend steadily to an object such as a phrase or a sentence is by making a series of efforts. But this power to renew the attack, to repeat the effort of attention, is lacking in the child. His eye may be on the blackboard, but it is not a "seeing eye." He may be looking, but he is not attending with attention at its best. For a child to give unwavering attention to a group of words for ten seconds is a physiological impossibility. For a child to gaze fixedly at a sentence for ten seconds without retinal fatigue is a physiological impossibility. To hold the eye in focus at a given point for ten seconds requires a series of repeated efforts. These repeated efforts produce upon the retina an effect similar to a series of repeated exposures of the same sensitive plate; the effect is a blur, physiologically and mentally.

The impression from the first exposure, the first throb of attention, is the clearest. It has been conclusively proved, experimentally, that this first glance covers the largest retina area or field. The edges of the retinal field begin to fade out very rapidly. Hence the glance of the first instant, with the wave of attention at its crest is most productive of efficiency in reading.

Now, this first wave of attention cannot hold at the crest for over three seconds. Any attempt to hold it longer is a waste of energy. It blurs the mental picture instead of making it clear. The command to "Look carefully"—that is, make repeated efforts of attention—produces results exactly opposite of what is intended. The longer the child looks the less he sees.

How short an exposure can be made effective? Mesmer found two-thousandths of a second long enough to recognize words. None of Cattell's subjects needed over one-hundredth of a second. As many as seven words (twenty-six letters) can be recognized with an exposure of one-tenth of a second. These figures make it clear that it is not necessary to follow the customary procedure of allowing children all the time they want to gaze at words they are given to read.

It has also been shown that the use of anything but the briefest effective exposure actually produces inefficiency in reading. If we are to get efficiency we must use brief exposures. It is hardly possible for a teacher to err on the side of making the exposure too brief. No apparatus of the ordinary room will give a clean-cut exposure of less than one-tenth of a second. That is enough. It is perfectly safe to say that if a child cannot read a phrase or a sentence of ten letters after a single exposure of one-half second, *he has not been properly prepared to read.* He should have had better preparation by drill in word-recognition and by the development of a proper apperceptive basis, intellectually and emotionally.

Summing up, then, we may say that, in the case of sentences short enough to be photographed on the child's retina in a single exposure, or in a single eye-pause in continued reading, efficiency demands that the teacher

follow one practical rule: *Make the "exposure" of reading as brief as possible.*

AIDS TO QUICK PERCEPTION.

(1) **A Movable Curtain.**—An old window shade will do. It serves to cover and to disclose blackboard work; also charts or other printed material.

Fasten a small screw-eye into each end of the curtain. Attach shade cord to each screw-eye. Into the (sacred?) word-work above the blackboard insert two large screw-eyes at exactly the same distance apart as the small ones on the curtain ends. Pass a cord through each. Lead one cord through the other large screw-eye. Take the two cords and tie them together, allowing sufficient length of cord for the curtain to drop to the bottom of the blackboard. In raising and lowering this curtain a pull on the two strings at a point beyond where they are tied together will move the two ends evenly. For such a curtain a live teacher will find many uses. *This curtain is an admirable apparatus for practice in concentration,* i. e., Quick Perception. The sentences used for reading are the best possible *material for practice in concentration.*

(2) **Class-Drill Cards.**—Cardboard slips on which sentences are printed in type large enough for class use—one and one-quarter inches high for children fourteen feet from the slips. These should have the sentence written upon the back so the teacher can hold the cards in front of her. A blank card may be placed in front as a "curtain." Let this be larger so as to be easily grasped and lifted. The teacher can take out the front printed card while the "curtain" is down. In this way an indefinite number of sentences may be presented. Any sentence which gives difficulty may be slipped back and repeated as often as desired.

These Class-Drill Cards have many advantages: (1) They are durable; once prepared, they may be used many times. (2) They are always ready. (3) They give practice in reading type or script at will. (4) They lend themselves admirably to use for brief exposures—the ideal drill in Concentration.

(3) **Individual Sentence Cards.**—One way for making these is by pasting cuttings from discarded books. If these cards are all delivered to the child face down, or in an envelope, drill can be given in quick perception of words. One concrete illustration may be suggestive. Suppose the class to read action sentences. Each pupil holds his card face downward, the teacher counts quickly: "One, two, turn! one, two, read! one, two, go!" The perceiving of the word is done between the command: "Read," and the command: "Turn"; the thinking is done before the word "Go!" Then comes the motor expression of the thought—not by vocalizing, but by doing. Such exercises, first uniform, for the class, then by rows, then individual, develop efficiency in rapid thought-getting. Is reading anything more?

(4) **Peeking at Books.**—This may be accomplished by opening, glancing and closing quickly, with the finger in the place. Better than this is the method of using a piece of paper to cover the writing. At command

this is shifted downward to disclose a sentence, then upward to cover it again. Then the pupils need not close the book. Speed and snap will make this effective practice.

Reading from the Blackboard.

From the first, when presentation is made on the blackboard, the muscles and the retina of the child's eye can be given practice in exactly the same sort of operations as are performed in reading print. Efficiency for reading print can, therefore, be developed from the first. This can be accomplished by adjusting the height of letters, the spacing of lines and the length of lines to the distance at which the child stands from the matter to be read.

The normal distance of the eye from the printed page is always assumed to be fourteen inches. Suppose that the child is distant fourteen feet, i.e., twelve times fourteen inches, then letters twelve times as high, and lines twelve times as far apart and twelve times as long, should be used on the blackboard. Such letters would cover exactly the same area on the retina and require exactly the same angular distance of eye-movement as would the same words in print of proper size.

In discussing the hygiene of reading, Shaw demands for the first-year child a *minimum* height in the small letters of 2.6 millimeters, about one-tenth of an inch. The *minimum* space between lines should be 4.5 millimeters (about .018 inch, or one-fifth).

All authorities are agreed that the *maximum* length of printed line should not be over 90 millimeters (3.6 inches).

Translating these figures into hygienic requirements for a child *fourteen feet* from the blackboard, we get the following figures: *Minimum* height of small letters (1¼ inches), one and one-quarter inches; *minimum* space between letters, two inches (2 inches); *maximum* length of line, 43.2 inches. Maximum length varies about three inches to the foot of distance from the reading matter.

THE HYGIENE OF BLACKBOARD PRESENTATION.

(1) *Blackboard writing must not be too large.* Few teachers write too small. Many put unnecessary strain on the child's eye by using great, sprawling letters. This requires the eye to cover needless space and produces needless strain. We are striving to develop efficiency in reading ordinary type, not newspaper "scare-heads."

Besides, you do not help the child to grasp the meaning of a written sentence by writing it in a large hand, any more than you help a foreigner to grasp the meaning of a spoken sentence by yelling at him. A moderate letter-height, like a moderate tone of voice, conduces to efficiency.

(2) *The lines of blackboard writing must not be too long.* For a distance of fourteen feet no line ought to be over 43.2 inches long. If children are taught reading in small groups, as they must be for effective teaching, i. e., for the development of efficiency in the pupil—then few children will need to be placed even fourteen feet from the blackboard. The efficient

reader follows the line by moving his eye, not his head. The pupil must learn to do the same. The habit of head-wagging is certainly one that must be "prevented." Warner tells of a case of apparently invincible stupidity in the study of Latin that was cured by the discovery and elimination of head-wagging. This habit is recognized—on the stage and off—as typical of the untrained and inefficient reader. Yet many teachers write upon the blackboard lines so long that the pupil must wag his head to read them. This forces upon the child a habit he ought never to learn.

Javal names as one of the principal causes of fatigue in reading—a cause tending to produce and aggravate "shortsightedness"—the strain on the muscles in the shifting accommodation as the eyes move over a long line. Long lines produce needless strain upon the tender muscles of the child's eye. They should be avoided on the blackboard and in print.

In this connection it is interesting to note that, while modern primers almost universally employ sufficiently large type, they nearly all use too long a line, that is, a line in excess of 3.6 inches. Before the writer lie twenty modern primers. Only one or two are to be rejected because of small type. But every one of them overruns this accepted maximum length of line; some do so very rarely, others frequently. Is it not time that principals and teachers insist on *books that meet all hygienic requirements, length of line included?*

Reading for the Meaning.

We have discussed the means and methods of presenting reading matter in such a way as to develop efficiency in the first step of the reading process—perceiving the words. We shall now consider very briefly the other phase of that process—getting the meaning.

There are many ways in which a person can show that he has got meaning out of reading matter he has looked at. Some of these are:

(1) Clothing the meaning in visible forms by using the *pictorial* or the *plastic arts*—drawings, painting, diagrams, maps, modeling, etc. The beginner's power to express meaning by these means is generally too crude and undeveloped to depend upon as a test of his grasp of meanings.

(2) By giving the *substance of what has been read,* either as a whole or in part, the pupil choosing his own words. This is adapted to the more advanced pupil. Nevertheless, it can be generally used, as it applies to almost all reading matter.

(3) *Answering specific questions,* either written on the blackboard, printed in the texts, or based upon these. This method can be and ought to be used frequently from the first. Some primers have sensible questions which the child can answer without feeling that he is talking merely to use words. The point to bear in mind is that the child should treat these questions as *put to him for him to answer,* not as words to repeat parrot-fashion.

(4) Putting the meaning into practice. Following instructions given in sentences, each of which involves at least one action-word. This method is the least used; yet it is better adapted for beginners than any other. Some practical suggestions follow:

Action-Sentences Dramatized.

(1) *In directions for physical exercises.* Begin with single written directions, such as "Stand! March! Run! Hop! Step! Halt! Sit." Then expand these. "Left turn." "Right turn." "March two steps." "Hop to the front." "Put out your left hand." These commands may be arranged in a series of numbered sentences, so as to make a complete exercise. The teacher counts alond: "One!" The pupils glance at the card and read the first sentence, e. g., "Stand." They do so. The teacher counts "Two." The pupil reads: "Turn to the left." Then "Turn to the right," and so on to "Sit down." No one speaks but the teacher. The children *read and do.*

(2) *In directions for games.* These develop along the same lines of Silent Reading followed by action; such as "Form a ring," "Catch the bean bag."

(3) *In written directions for silent seat work.*—"Take ten sticks. Put them in a pile. Tie them up. Make nine more piles." Or, "Draw a boy. Draw his dog. Draw a tree. Draw a cat in the tree. Write what the boy said to his dog. Write what he said to the cat." Or, "Build a house. Put four blocks," etc.

(4) *In directions for class work.*—(a) In numbers: "Count your blocks. Build the "long stair" (Montessori). "Make a pile of six sticks. Make a pile of four sticks. Write how many sticks are six sticks and four sticks." (b) In hygiene: "Play: comb your hair. Play: Brush your teeth. Play: Sit erect. Sweep the floor. Wipe off your desk. Show what you would do to a fly. Show how your window should be at night."

The pupil who reads and acts out sentences such as the foregoing reads to find out what to do. When he knows the meaning he acts. *This combines motivated reading, thought-getting, and self-expression.*

Summary.

The following points have been made in our study of efficiency in reading:

(1) Speed is the chief measure and the greatest promoter of all-around efficiency.

(2) Reading matter should be given the briefest possible exposure.

(3) The units of presentation should be large; the "field' taken in at each eye-pause must be expanded.

(4) The modes of presentation must not develop needless or harmful habits. Long gazing, slow reading and head-wagging must not be permitted.

(5) The form in presentation must meet hygienic requirements as to size of type or blackboard writing, length of line and line beginnings.

(6) The study of word-forms, as such, must precede and be kept absolutely separate from practice in the reading process. Word-drills, phonics, enunciation-drills, language-lessons, acquiring familiarity with the

thought, the development of a proper intellectual and emotional apperceptive basis—all these must be kept out of the reading-lesson so far as possible.

(7) Grasp of meaning should be tested by other means than vocalization, e. g., giving the substance, answering questions, or dramatizing action-words, making pictures as illustrations.

(8) There might well be a widely extended use of action-words dramatized but not pronounced.

(9) Reading aloud—a difficult and complex attachment to the reading-process—ought to be used merely as one means among others for testing grasp of meaning. As a test it is inconclusive; it must always be checked up by other tests.

(10) The kind of reading most used in practical life is the kind in which proficiency and efficiency are worth while. This means that our chief efforts to secure efficiency should center around the practice of Silent Reading—Reading for Thought.

Instead of considering this subject as covered by the foregoing fragmentary treatment, the writer wishes to propose certain questions to think about.

Questions Raised.

It is a rock-bottom principle in modern scientific psychology that no habit of the nervous system should be constantly practised, no association of ideas in the mind should be constantly aroused, if that habit or association of ideas must later be sloughed off and a new habit or association learned. Consider in the light of this principle the following questions:

(1) What about the use of diacritical marks for beginners?

(2) What about special type or printing? or, the use of "crossed-out" letters?

(3) What about printing or writing syllables with hyphen separations?

(4) What about constant stops to analyze words, *if the pupil can read them?*

(5) What about the constant association of an audio-motor activity with the look of words, as in the over-emphasis of phonics? Does this produce regard for meaning or for form? Which is more vital?

(6) What about the constant drills based upon the principle that words should function in vocalization, in reading alound, in talking rather than in doing?

(7) In view of ascertained facts concerning the possibilities of greater efficiency in the reading-process, shall we rest content with the present efficiency (?)—or deficiency—of our pupils—shall we go on training in the same old ways, developing the same slow habits, or shall we seek with all diligence the ways that lead to increased efficiency, to better things?

Graded Exercises in Dictation—4B*

By Ella K. Jelliffe.

Lesson I.

I Can't.

"I can't" is a sluggard,
Too lazy to work;
From duty he shrinks,
Every task he will shirk,
No bread on his board,
And no meal in his bag;
His house is a ruin,
His coat is a rag.

I Can.

"I can" is a worker;
He tills his broad fields,
And digs from the earth
All the wealth that it yields.
The hum of his spindles
Begins with the light,
And the fires of his forges
Are blazing all night.

Lesson II.

Washington Irving, an American writer, was born in New York, in 1783. His first book was called "Knickerbocker's History of New York."

In 1820, he published his "Sketch Book," a number of delightful pen pictures on various subjects. The best known of these sketches are "Rip Van Winkle" and the "Legend of Sleepy Hollow."

At the close of his life, Irving wrote the "Life of Washington."

Lesson III.

In England there once reigned a Danish king named Canute. King Canute was wise and sensible, and he thought he would teach his foolish, flattering officers a good lesson.

He had his chair placed on the seashore and he commanded the waves to come no farther.

But the tide came in just as it always did; so he turned to his men and said: "There is only one king who is all-powerful. It is He who rules the sea. Praise Him."

Lesson IV.

Then out spake brave Horatius,
The captain of the gate:
"To every man upon this earth
Death cometh soon or late.
And how can man die better
Than facing fearful odds,
For the ashes of his fathers
And the temples of his gods?"

"Hew down the bridge, Sir Consul,
With all the speed you may;
I, with more to help me,
Will hold the foe in play.
In yon straight path a thousand
May well be stopped by three.
Now who will stand on either hand,
And keep the bridge with me?"

Read the poem from Macaulay's "Lays of Ancient Rome" or the story from "Fifty Famous Stories Retold" by James Baldwin; American Book Co.

Lesson V.

Cornelia was a Roman lady, the mother of two sons. One day she sent for the boys to come and dine with her and a friend.

After dinner, the friend opened a casket of jewels and showed them ropes of pearls, white as milk and smooth as satin; heaps of shining rubies,

---

*Exercises for Grades 2A-4B will appear in the October, 1913 number.

red as the glowing coals; sapphires as blue as the sky that summer day, and diamonds that flashed and sparkled like the sunlight.

Turning to Cornelia, the lady said, "Is is true, Cornelia, that you have no jewels?"

For answer, Cornelia drew her two boys to her side, and said: "Here are my jewels. They are worth more than all your gems."

Lesson VI.

Loving words will cost but little
  Journeying up the hill of life,
But they make the weak and weary
  Stronger, braver for the strife.

Do you count them only trifles?
  What to earth are sun and rain?
Never was a kind word wasted,
  Never was one said in vain.

Lesson VII.

Those who live on the mountain have a longer day than those who live in the valley. Sometimes all we need to brighten our day is to rise a little higher.

Many a heart is hungry, starving
  For a little word of love.
Speak it then, and as the sunshine
  Gilds the lofty peaks above,

So the joy of those who hear it
  Sends its radiance down life's way,
And the world is brighter, better
  For the loving words we say.

Lesson VIII.

The Mountain and the Squirrel.

The mountain and the squirrel had a quarrel,
And the former called the latter "Little prig";
Bun replied:
"You are doubtless very big,
But all sorts of things and weather
Must be taken in altogether
To make up a year,
And a sphere;
And I think it no disgrace
To occupy my place.
If I'm not so large as you,
You are not so small as I,
And not half so spry;
I'll not deny you make
A very pretty squirrel track.
Talents differ; all is well and wisely put;
If I cannot carry forests on my back,
Neither can you crack a nut." —R. W. Emerson.

Lesson IX.

Not long after the bluebird comes the robin, sometimes in March, but in most of the Northern States April is the month of the robin. In large numbers they scour the fields and groves. Your hear their piping in the meadow, in the pasture, on the hillside. Walk in the woods and the dry

leaves rustle with the whir of their wings, the air is vocal with their cheery call. In excess of joy and vivacity, they run, leap, scream, chase each other through the air, diving and sweeping among the trees with perilous rapidity.

—JOHN BURROUGHS.

LESSON X.

Lakewood, N. J., April 3, 1912.

Dear Florence: We arrived here yesterday. It's a beautiful place! We have already walked around the lake and we have had a drive through the pine woods.

I am sending you a little box of arbutus, which I picked for you, myself; it grows near the roots of trees, hidden under leaves. Isn't it shy and sweet and pretty? Oh! I wish you could be here with us to enjoy the fragrant air! I miss you. Mother joins me in sending love to you.

Your affectionate friend, RUTH.

5A

"Paragraphs and stanzas from. . . dictation."—*Syllabus.*

LESSON I.

(New Words—Blunders, absurdities, serenely, encumbent, nonsense, Emerson.)

Finish every day and be done with it. You have done what you could; some blunders and absurdities crept in; forget them as soon as you can. Tomorrow is a new day: yau shall begin it well and serenely and with too high a spirit to be encumbered with your old nonsense. EMERSON.

(Emerson, a great American writer, lived from 1821 to 1882.)

LESSON II.

(New Words—Blessings, barefoot, pantaloons, whistled, jaunty, turned-up, Whittier.)

The Barefoot Boy.

Blessings on thee, little man,
Barefoot boy, with cheek of tan!
With thy turned-up pantaloons,
And thy merry whistled tunes;
With thy red lip, redder still
Kissed by strawberries on the hill;
With the sunshine on thy face,
Through thy torn brim's jaunty grace;
From my heart I give thee joy!
I was once a barefoot boy.

—WHITTIER.

(Whittier, called the Quaker poet, was born in Massachusetts in 1807 and died in 1892.)

LESSONS III AND IV.

To JOHN GREENLEAF WHITTIER:

Boston, December 17, 1890.

Dear Kind Poet: This is your birthday; that was the first thought which came into my mind when I awoke this morning, and it made me glad

to think I could write you a letter and tell you how much your little friends love their sweet poet and his birthday. This evening they are going to entertain their friends with music and readings from your poems. I hope the swift-winged messengers of love will be here to carry some of the sweet melody to you, in your little study by the Merrimac.

If I were with you today, I would give you eighty-three kisses, one for each year you have lived. Eighty-three years seems very long to me. Does it seem long to you? . . .

I received the letter which you wrote me last summer, and I thank you for it. I am staying in Boston now, at the Institution for the Blind.

Teacher is well, and sends her kindest remembrance to you. The happy Christmas time is almost here! I can hardly wait for the fun to begin! I hope your Christmas Day will be a very happy one and that the New Year will be full of brightness and joy for you and everyone.

From your little friend, HELEN A. KELLER.

(Helen Keller was ten years old when she wrote this letter. She is blind and deaf, but she has become a great scholar through the able teaching of Miss Sullivan.)

LESSON V.

(New Words—Oak Knoll, California, relatives, Haverhill, excellent.)

Whittier's Reply to Helen Keller.

My Dear Young Friend: I was very glad to have such a pleasant letter on my birthday. I had two or three hundred others, and thine was one of the most welcome of all. I must tell thee about how the day was passed at Oak Knoll. Of course the sun did not shine, but we had great open wood fires in the rooms, which were very sweet with roses and other flowers, that were sent me by distant friends, and fruits of all kinds from California and other places. Some relatives and dear old friends were with me through the day.

I do not wonder thee thinks eighty-three years a long time, but to me it seems but a very little while since I was a boy, no older than thee, playing on the old farm at Haverhill. I thank thee for thy good wishes, and wish thee as many. I am glad thee is at the Institution; it is an excellent place. Give my best regards to Miss Sullivan, and with a great deal of love, I am, thy old friend, JOHN G. WHITTIER.

LESSON VI.

(New Words—Petty, irritating, concerns, perform, laughter, cheerfulness, abound, industry, blithely, business, weary, undishonored.)

AT MORNING.

The day returns and brings us the petty round of irritating concerns and duties. Help us to play the man, help us to perform them with laughter and kind faces, let cheerfulness abound with industry. Give us to go blithely on our business all this day, bring us to our resting beds weary and content and undishonored, and grant us in the end the gift of sleep.

ROBERT LOUIS STEVENSON.

(Stevenson was born in Scotland in 1850 and after writing many poems and stories, died in 1894.)

Lesson VII.

The Arrow and the Song.

I shot an arrow into the air,
It fell to earth, I knew not where;
For, so swiftly it flew, the sight
Could not follow it in its flight.

I breathed a song into the air,
It fell to earth, I knew not where;
For who has sight so keen and strong
That it can follow the flight of song?

Long, long afterward, in an oak
I found the arrow, still unbroke;
And the song, from beginning to end,
I found again in the heart of a friend.

—Henry Wadsworth Longfellow.

(Longfellow, an American poet, was born in Maine, 1807, and died in 1882.)

Lesson VIII.

In 1271 Marco Polo, with his father and uncle, set out from Venice and visited what is now Turkey in Europe, Turkey in Asia, Persia, India, and some of the East India islands. For years he remained at the court of the Great Khan, as the Emperor of China was then called.

The three Venetians told the Khan much about the people and countries of Europe and showed him how to build certain engines of war which enabled him to overcome his enemies. Marco himself was appointed governor of one of the large provinces of China and held that position for several years.

Lesson IX.

The most famous of Queen Elizabeth's sea captains was Francis Drake. He was born in the south of England. When a boy, his home was the hulk of an old ship in the harbor of Plymouth, the most important seaport of that region.

Drake was a sailor from his earliest youth and became a captain before he was twenty-one. He made many voyages to different parts of the world and soon became known as one of the most daring and skilful sailors of his day. Several times he visited the Spanish lands of the New World.

—*From U. S. History for 5 A.*

Lesson X.

Jefferson's Ten Rules.

Never put off until tomorrow what you can do today.
Never trouble another for what you can do yourself.
Never spend your money before you have earned it.
Never buy what you don't want because it is cheap.
Pride costs more than hunger, thirst, and cold.
We seldom repent of having eaten too little.
Nothing is troublesome that we do willingly.
How much pain the evils have cost us that have never happened.
Take things always by the smooth handle.
When angry, count ten before you speak; if very angry, count a hundred.

5B

Lesson I.

(New Words—Folk, harebell, trembling, birth, lilies, thornless, growth, excels, Christina G. Rossetti.)

The Flower Folk.

Hope is like a harebell trembling from its birth,
Love is like a rose the joy of all the earth;
Faith is like a lily lifted high and white,
Love is like a lovely rose the world's delight;
Harebells and sweet lilies show a thornless growth,
But the rose with all its thorns excels them both.

—*Christina G. Rossetti.*

Lesson II.

(New Words—Architects, massive, ornaments, rhyme, useless, strengthens, supports.)

The Builders.

All are architects of Fate,
Working in these walls of Time;
Some with massive deeds and great
Some with ornaments of rhyme.

Nothing useless is, or low;
Each thing in its place is best;
And what seems but idle show
Strengthens and supports the rest.

—*Longfellow.*

(Call attention to the indenting of rhymed lines.)

Lesson III.

(Difficult Words—New Amsterdam, Dutch, settlement, Manhattan, governors, Holland, soldiers, English, claimed, obliged, surrender, colony, Swedes, succeeded.)

New York.

In 1626 the Dutch settled on Manhattan Island, and called their town New Amsterdam. Governors were sent over from Holland. They had trouble with the English and with the Swedes but succeeded in driving them away. In 1664 the English came again and claimed the country. This time the Dutch were unable to hold their forts, and were obliged to surrender to the English. The name of the colony was then changed to New York.

Lesson IV.

(Difficult Words—President, United States, fulfilled, position, utmost, promptitude, punctuality, business, appointed, promised, striking, twelve, Congress, minute, finished.)

When Washington was President of the United States he fulfilled every duty of his position with the utmost promptitude; yet he was never in a hurry. The secret of it all lay in his punctuality.

When he fixed a time for any business he would never wait a minute beyond the hour appointed. If he promised to meet Congress at noon, he would be at the door before the clock had finished striking twelve.

LESSON V.

(Difficult Words—Pleasure, excellent, certainly, received, per cent., studies, absent, tardy, during, whole, pupils, record, concert, Saturday, Brooklyn *Daily Eagle,* medals, presented, Eureka.)

Brooklyn, New York, Feb. 17, 1913.

DEAR DOROTHY:—It gave me great pleasure to hear of your excellent school report for last term. I certainly am proud to know that you received over ninety per cent. in all your studies and that you were neither absent nor tardy during the whole term. Eureka!

Last Saturday the Brooklyn *Daily Eagle* tendered a concert to the honor pupils of our schools and presented silver medals to the very best. Four of the pupils in our school received medals. If you had been in one of the Brooklyn schools, I'm sure you would have received one of the medals. Affectionately yours,

AUNT ELLA.

LESSON VI.

(Difficult Words—Bluebird, sometimes, Northern, April, scour, piping, meadow, pasture, rustle, whir, vocal, cheery, excess, vivacity, perilous, rapidity, Burroughs.)

Not long after the bluebird comes the robin, sometimes in March, but in most of the Northern States April is the month of the robin. In large numbers they scour the fields and groves. You hear their piping in the meadow, in the pasture, on the hillside. Walk in the woods, and the dry leaves rustle with the whir of their wings, the air is vocal with their cheery call. In excess of joy and vivacity, they run, leap, scream, chase each other through the air, diving and sweeping among the trees with perilous rapidity.

JOHN BURROUGHS.

LESSON VII.

(Difficult Words—Pulpit, preaches, squirrel, sparrow, perch, lily, reverence, Sabbath, anemones, buttercups' faces, beaming, bonnets, daisies, prayer, dandelions.)

Jack in the Pulpit.

Jack in the pulpit
  Preaches today
Under the green trees
  Just over the way.
Squirrel and song sparrow,
  High on their perch,
Hear the sweet lily bells
  Ringing to church.
Come hear what his reverence
  Rises to say
In his low, painted pulpit,
  This calm Sabbath day.

Meek-faced anemones,
  Drooping and sad;
Great yellow violets,
  Smiling out glad;
Buttercups' faces,
  Beaming and bright;
Clovers with bonnets,
  Some red and some white;
Daisies, their whitefingers
  Half clasped in prayer;
Dandelions, proud of
  The gold in their hair.

LESSON VIII.

(Difficult words—William Penn, wealth, opinions, Quaker, doctrines, petition, due, Pennsylvania.)

By the death of his father, William Penn became a rich man; but his wealth did not change his opinions or habits. He remained just as much a Quaker as before, and still went about preaching Quaker doctrines.

In 1680, he presented a petition to King Charles II, asking for a grant of land in America, in return for money due his father. The king granted this petition and gave him Pennsylvania.

LESSON IX.

(Difficult Words—Properly, plainly, speech, ostentation, understood, knowledge, judgment, against, authority.)

Speak properly, and in as few words as you can, but always plainly; for the end of speech is not ostentation, but to be understood.

He that has more knowledge than judgment is made for another man's use more than his own.

Believe nothing against another but upon good authority. PENN.

LESSON X.

(Difficult Words—February, St. Valentine's day, suspect, confess, according, English.)

Brooklyn, N. Y., February 14, 1913.

Dear Mildred: This is St. Valentine's day and I have received four valentines. I suspect that one of them came from you—the pretty book-mark with red ribbon on it. Now confess, did you not send it?

Be sure to come to school on Monday, for we are to get new seats according to our marks in English. As our marks were the same, I think we shall be near each other.

I hope your cold has gone. Your friend, ETHEL.

6A

LESSON I.*

The Maid of Orleans.

Jeanne d'Arc was the child of a French laborer. She was a good girl, simple and pleasant in her ways. She was always tender to the poor and the sick, and loved to listen to the church bell and sit dreaming, while she sewed by her mother's side.

When war broke out in France, Jeanne yearned to save her dear country. She had visions urging her to go to the king and ask him to let her lead the army to Orleans, which was besieged by the English. He consented, and she dressed herself in white armor from head to foot, mounted her charger, and led ten thousand men-at-arms to the city and saved it.

LESSON II.

Waterloo.

On the eighteenth of June, 1815, the battle of Waterloo was fought in Belgium. The French under Napoleon fought against the English under

**Long selections are intended for two lessons. Study new and difficult words first.*

Wellington. Both sides fought with the utmost bravery; but when the Prussians under Blucher came to the aid of the English, all was lost to the great conqueror of Europe. Napoleon fled to Paris, whither the English and Prussian armies followed, entering with triumph the French capital.

"And there was mounting in hot haste; the steed
The mustering squadron, and the clattering car,
Went pouring forward with impetuous speed,
And swiftly forming in the ranks of war;
And the deep thunder peal on peal afar;
And near, the beat of the alarming drum
Roused up the soldier ere the morning star;
While thronged the citizens with terror dumb,
Or whispering with white lips, "The foe!
They come! they come!'"

(*Give either the prose or the poetic selection.*)

LESSON III.

"Girt round with rugged mountains
The fair Lake Constance lies;
In her blue heart reflected,
Shine back the starry skies;
And watching each white cloudlet
Float silently and slow,
You think a piece of heaven
Lies on our earth below!

Midnight is there; and silence,
Enthroned in heaven, looks down
Upon her own calm mirror,
Upon a sleeping town;
For Bregenz, that quaint city
Upon the Tyrol shore,
Has stood above Lake Constance,
A thousand years and more."

LESSON IV.

Sir John Moore.

Sir John Moore was one of the most distinguished officers of the British army that took part in the wars that grew out of the French Revolution and the reign of Napoleon. He was born in Glasgow, in 1761, and after serving faithfully through campaigns in Corsica, in the West Indies, in Holland, in Sweden, and in Egypt, he was knighted and promoted to the position of major-general.

Near the close of a victorious engagement with the French in Spain, Sir John was struck by a cannon-ball, which inflicted a mortal wound, but he lived long enough to know that his masterly arrangement of the troops had secured the safety of the army.

LESSON V.

"Not a drum was heard, not a funeral note
As his corse to the rampart we hurried;
Not a soldier discharged his farewell shot
O'er the grave where our hero we buried.

Slowly and sadly we laid him down,
From the field of his fame fresh and gory!
We carved not a line, we raised not a stone,
But we left him alone in his glory."

LESSON VI.

Brooklyn, February 10, 1913.

Dear Mary: All the girls are sorry that you are sick and not able to attend school. I hope you will soon be well again.

I am keeping the notes of the different lessons for you; also those about famous people for our scrap-books. Miss Jerrold read about Rosa Bonheur to us; she was a French artist and painted many pictures, especially of animals. A party of us are going to the Metropolitan Museum of Art to see her "Horse Fair," which Mr. Vanderbilt paid $50,000 for and then presented it to the museum.

Are you able to study the Gettysburg Address? We know it all now, and when we say it altogether, it just thrills me—it is so beautiful!

Your loving friend, JENNIE.

LESSON VII.

George Washington.

Among the builders of our country one man looms up above them all. Thousands have risked their lives in America's battles. Hundreds have given the best of their energy to the building of America's institutions, and many have served as her chief executive. But none of these have needed the steadfast faith and courage to hold together a few crude colonists against a king's disciplined army. None of these have faced the problem of forming a nation out of thirteen impoverished colonies, at the close of a long war. At the very head of America's great men stands George Washington, the father of his country, "first in war, first in peace," and always "first in the hearts of his countrymen."—From Southworth's "Builders of Our Country" (II).

LESSON VIII.

The American Revolution began with the battle of Lexington, April 19, 1775, and ended with the surrender of Cornwallis at Yorktown on October 19, 1781.

To the tune of "The World Turned Upside Down," the British marched out of Yorktown between the two long lines of Washington's victorious army.

LESSON IX.

What the United States shall become tomorrow will lie in the hands of those who are the children of today. Abraham Lincoln said at Gettysburg: "We here highly resolve that government of the people, by the people, and for the people shall not perish from the earth." If every citizen cares for his own gain alone, the country will become weak; but if everyone cares for the gain of all, it will become strong, and the world will be the better because of the power and the greatness of the United States of America.—From "Our Country's Story"—Tappan.

LESSON X.

Hanover, N. H., July 4, 1910.

Dear Anna: We arrived at this pretty place three days ago; and we have already walked all over the town and rowed on the river (the Connecticut) and lounged in the pine woods.

A little house was pointed out to us as the home of Daniel Webster. He studied at Dartmouth College here. Do you remember how he learned the Constitution of the United States from a cotton handkerchief on which it was printed, and how he had to wait a long while to save up the twenty-five cents to buy it?

What is it that Longfellow says—

"Lives of great men all remind us
We can make our lives sublime,
And departing, leave behind us
Footprints on the sands of time."

You will think this is a very literary letter from me; but I can just tell you, a fellow feels the influence of these "classic shades."

Your big brother, FRED.

6B

Put difficult words on the blackboard for discussion and study before dictating each lesson.

LESSON I.

Difficult Words:—Unfurled, azure, dyes, baldric, celectial, symbol.

The American Flag.

"When freedom, from her mountain height,
Unfurled her standard to the air,
She tore the azure robe of night,
And set the stars of glory there!
She mingled with its gorgeous dyes
The milky baldric of the skies,
And striped its pure celestial white
With streakings of the morning light;
Then, from his mansion in the sun,
She called her eagle bearer down;
And gave into his mighty hand
The symbol of her chosen land!"

—JOSEPH RODMAN DRAKE.

LESSON II.

Japan.

Japan! What a wonderful country it is! It is the island empire of the Far East, one of the most beautiful lands on the other side of the globe. Lying as it does in the deep waters of the western Pacific, the country winds in and out like a snake from southwest to northeast, a distance of more than two thousand miles. This snake is made up of hundreds of mountainous islands, and it drags its length through almost every climate known to man. Its tail, formed by the island of Formosa, lies in the warm waters just above the Philippine Islands, flapping as it were upon the Tropic of Cancer. It thus makes Japan our next door neighbor.—Carpenter's Geographical Reader.

LESSON III.

Preliminary Explanation—Ulysses was a Greek hero who took part in the Trojan war and who afterwards wandered over many lands for twenty years. The Greek poet, Homer, tells about these wanderings of Ulysses in a book called "The Odyssey.

Phaeacia, a land visited by Ulysses, where he met Nausicaa, daughter of the king, Alcinous.

Difficult words for spelling, meaning and use—Magnificence, grandeur, proportion, architecture, art, statues, rapt, admiration, surveying, flourishing, estate, peers, rampires, resort.

Ulysses at the Court of Phaeacia.

Ulysses, as he entered the city, wondered to see its magnificence, its markets, buildings, temples; its walls and rampires; its trade, and resort of men; its harbors for shipping, which is the strength of the Phaeacian state. But when he approached the palace, and beheld its riches, the proportion of its architecture, its avenues, gardens, statues, fountains, he stood rapt in admiration, and almost forgot his own condition in surveying the flourishing estate of others; but recollecting himself, he passed on boldly into the inner apartment, where the king and queen were sitting at dinner with their peers, Nausicaa having prepared them for his approach.—From "The Adventures of Ulysses," by Chas. Lamb.

LESSON IV.

The Golden Fleece originally belonged, it appears, to a Bœotian ram, who had taken on his back two children, when in danger of their lives, and fled with them over land and sea, as far as Colchis. One of the children, whose name was Helle, fell into the sea and was drowned. But the other (a little boy, named Phrixus) was brought safe ashore by the faithful ram, who, however, was so exhausted that he immediately lay down and died. In memory of this good deed, and as a token of his true heart, the fleece of the poor dead ram was miraculously changed to gold, and became one of the most beautiful objects ever seen on earth. It was hung upon a tree in a sacred grove, where it had now been kept I know not how many years, and was the envy of mighty kings, who had nothing so magnificent in any of their palaces."—"Tanglewood Tales."—Hawthorne.

LESSON V.

Brooklyn, N. Y., February 22, 1913.

Dear Bessie: Tomorrow is my birthday, as you know, and everybody is sending me beautiful presents ahead of time, this year. First, your lovely box came, and you know how delighted I was with all its most acceptable contents.

I told you of the Irish crochet collar from Aunt Bessie, did I not? and Aunt Sara is sending me a dainty new gown, she writes.

This morning a box of roses came to me—perhaps you can guess where they came from! Their fragrance is filling the room now, as I write.

Half an hour after the arrival of the roses, a cocoa-set of Japanese china was brought to me, and the strangest thing about it is that it is the

very set I coveted when I saw it, a month ago, in our favorite Japanese store.

Isn't everybody kind to me? I'm the happiest girl alive, I think; and I know you are glad to share this happiness of

Your sister, HELEN.

LESSON VI.

Chambered, Nautilus, feign, main, venturous, bark, enchanted, siren, reefs, rocks.

The Chambered Nautilus.

"This is the ship of pearl which poets feign
Sails the unshadowed main,—
The venturous bark that flings
On the sweet summer wind its purpled wings
In gulfs enchanted, where the Siren sings,
And coral reefs lie bare,
Where the cold sea-maids rise to sun their streaming hair."

—OLIVER WENDELL HOLMES.

(Show a picture of the Nautilus and have the pupils draw it at the head of the paper.)

LESSON VII.

A Composition on Ivory.

(Difficult Words—Elephant, walrus, hippopotamus, bony, material, tusks, species, texture, interlacing, elastic, flexible, phosphoric acid, semi-transparent, delicacy, miniature.)

Ivory.

Outline—(1) Source, (2) Appearance, (3) Uses, (4) Workers in Ivory.

The large teeth or tusks of the elephant, walrus and hippopotamus furnish a hard, bony material which is called ivory. The largest supply and finest quality of this article comes from Africa. Much of the ivory in use comes from collections of bones and tusks found in Asia, which are supposed to be the remains of a species of animals, immensely large, now no longer in existence.

The ivory obtained from elephants is a hard, white substance, fine in texture and showing when examined a fine network composed of curved lines crossing and interlacing each other. Ivory is somewhat elastic, and can be made still more flexible by placing it in a solution of phosphoric acid. It then becomes semi-transparent.

Large quantities of this substance are used for knife-handles, billiard balls, chessmen, portions of games and toys. The keys of pianos and parts of other musical instruments are made of ivory. Ivory obtained from the hippopotamus is very white and not grained like the elephant ivory. It is used by dentists for making artificial teeth.

France manufactures beautiful articles out of this material, but the Chinese are the leading workmen in this art. They carve it with the utmost delicacy, and make miniature chapels, gods, images, vases, and ornaments of it, the ivory often presenting a lace-like appearance. It is often used as a background for delicate paintings and portraits.—Abridged from MacLeod.

Lesson VIII.

"I once had a little brother
With eyes that were dark and deep;
In the lap of that olden forest
He lieth in peace asleep;
Light as the down of the thistle,
Free as the winds that blow,
We roved there the beautiful summers
The summers of long ago;
But his feet on the hills grew weary,
And one of the autumn eves
I made for my little brother
A bed of the yellow leaves.

. . . . . .

He fell in his saint-like beauty,
Asleep by the gates of light.
Therefore, of all the pictures
That hang on Memory's wall,
The one of the dim old forest
Seemeth the best of all."

—Alice Cary.

Lesson IX.

Brooklyn, N. Y., February 22, 1913.

Dear George: Did you see the Washington Birthday number of *The Youth's Companion?* It has a fine story of a boy who played a "dirty" ball in baseball. I'll bring my paper to your house on Saturday, when I call for you to go to the game. Be sure to be ready at one o'clock, prompt.

Don't you think we ought to beat the other nine this time? Jimmy Black is a fine catcher, and Aleck Jones is the best pitcher we ever had; the fielders are good, and you and I can run like everything, can't we? I hope we'll win; we must!

Hoping for good luck, I am your companion in arms,

John Randolph.

Lesson X.

Famous Sayings.

I only regret that I have but one life to lose for my country.—Nathan Hale.

Be sure you are right—then go ahead.—David Crockett.

Let our object be our country, our whole country, and nothing but our country.—Daniel Webster.

Cowards die many times before their deaths,
The valiant never taste of death but once.—Shakespeare.

7A

Lesson I.

(Difficult words—Gloaming, busily, fir, ermine, Carrara, chanticleer, muffled, swan's-down, fluttered, Lowell.

A Snow Storm.

The snow had begun in the gloaming,
And busily all the night
Had been heaping field and highway
With a silence deep and white.
Every pine and fir and hemlock
Wore ermine too dear for an earl,
And the poorest twig on the elm tree
Was ridged inch-deep with pearl.
From sheds new-roofed with Carrara
Came chanticleer's muffled crow,
The stiff rails were softened to swan's-down,
And still fluttered down the snow.

—Lowell.

Lesson II.

(Difficult words—Session, perennial, excellent, phlox, hibiscus, bulbs, especially, crocuses, daffodils, tulips, annual, petunias, poppies, alyssum, useful.)

The Planting of Flowers in the School Yard.

Only those flowers should be used which are very easy to grow and which have the habit of taking care of themselves. They should also be such as bloom in spring or fall, when the school is in session. Perennial plants—those which live from year to year—are excellent. Of these, day lilies, bleeding hearts, pinks, bluebells, hollylocks, perennial phlox and hibiscus are always useful. Nothing is better than the common wild asters and goldenrods. They will grow almost anywhere, and they improve when grown in rich ground and given plenty of room; and they bloom in the fall.

Many kinds of bulbs are useful, especially as so many of them bloom very early in spring. Think of a school yard with crocuses, daffodils and tulips in it!

Annual flowers may be grown along the borders, out of the way of the playgrounds. China asters, petunias and California poppies are very attractive, and they are easy to grow. They bloom in the fall. Phlox, sweet peas, alyssum and many others are also useful.

John W. Spencer,
In Arbor Day Annual, 1904.

Lesson III and Lesson IV.

Difficult words to be studied—Massachusetts, petition, hopped, Americans, thoughtless, feathers, cruel, humbly, whistle, currants, oriole, bobolink, porch, hermit thrush, George F. Hoar.

The Birds' Petition.

The bird petition was presented, like other petitions, to the Massachusetts legislature by Hon. George F. Hoar. It was received with great respect and resulted in a bill for the further protection of the birds, making it a penal offense to sell, wear or have possession of the feathers of song birds for the purpose of ornament.

This petition, although it refers to the birds of a neighboring State, is of particular interest to our boys and girls and to every lover of birds.

We, the song birds of Massachusetts and their playfellows, make this our humble petition:

We know more about you than you think we do. We know how good you are. We have hopped about the roofs and looked in at the windows of the houses you have built for poor and sick and hungry people and little lame and deaf and blind children.

We have built nests in the parks you have made so beautiful for your poor children to play in.

Every year we fly a great way over the country, keeping all the time where the sun is bright and warm.

We are Americans just as you are. Some of us, like some of you, came across the great sea, but most of us have lived here a long while. Our fathers and mothers have always done their best to please your fathers and mothers.

Now, we have a sad story to tell you. Thoughtless or bad people kill us because our feathers are beautiful. Cruel boys destroy our nests and steal our eggs and our young ones.

People with guns lie in wait for us as if the place for a bird is not in the sky, alive. If this goes on, all the song birds will be gone.

Now, we humbly pray that you will stop all this and save us from our sad fate. You have already made a law that no one shall kill a harmless song bird. Will you please make another that no one shall wear our feathers? Your pretty girls are pretty enough without them.

We are told that it is as easy for you to make this law as for a blackbird to whistle. If you will, we know how to pay you a hundred times over. We will play about your gardens and flower beds. We will destroy the wicked insects and worms that spoil your currants and plums and roses.

We will give to you our best songs. Every June morning, oriole and bobolink will fly after you and make the day more delightful to you. When you sit on your porch hermit thrush and wood thrush will sing to you.

We know where we are safe. In a little while all the birds will come to live in Massachusetts again, and everybody who loves music will like to make a summer home with you.

GEORGE F. HOAR.

LESSON V.

The Black Brothers.

The whole of this little valley belonged to three brothers, called Schwartz, Hans and Gluck. Schwartz and Hans, the two elder brothers, were very ugly men, with overhanging eyebrows and small dull eyes, which

were always half shut, so that you couldn't see into *them,* and always fancied they saw very far into *you.* . . . They worked their servants without any wages, till they would not work any more, and then quarreled with them, and turned them out of doors, without paying them. . . . In a word, they were of so cruel and grinding a temper as to receive from all those with whom they had any dealings the nickname of the "Black Brothers."

The youngest brother, Gluck, was as completely opposed, in both appearance and character, to his seniors as could possibly be imagined or desired. He was not above twelve years old, fair, blue-eyed, and kind in temper to every living thing. He did not, of course, agree particularly well with his brothers, or rather, they did not agree with *him.*

Lesson VI.

Daffydowndilly was so called because in his nature he resembled a flower, and loved to do only what was beautiful and agreeable, and took no delight in labor of any kind. But while Daffydowndilly was yet a little boy, his mother sent him away from his pleasant home and put him under the care of a very strict schoolmaster, whe went by the name of Mr. Toil. Those who knew him best affirmed that this Mr. Toil was a very worthy character; and that he had done more good, both to children and grown people, than anybody else in the world. Certainly he had lived long enough to do a great deal of good; for, if all stories be true, he had dwelt upon earth ever since Adam was driven from the garden of Eden.

Lesson VII.

Mr. Toil had a severe and ugly countenance, especially for such little boys or big men as were inclined to be idle; his voice, too, was harsh; and all his ways and customs seemed very disagreeable to our friend Daffydowndilly. The whole day long, this terrible old schoolmaster sat at his desk overlooking the scholars, or stalked about the schoolroom with a certain awful birch rod in his hand. Now came a rap over the shoulders of a boy whom Mr. Toil had caught at play; now he punished a whole class who were behindhand with their lessons; and, in short, unless a lad chose to attend quietly and constantly to his book, he had no chance of enjoying a quiet moment in the schoolroom of Mr. Toil.

Lesson VIII.

It was a game called Yes and No, where Scrooge's nephew had to think of something, and the rest must find out what; he only answering to their questions yes or no, as the case was. The brisk fire of questioning to which he was exposed elicited from him that he was thinking of an animal, a live animal, rather a disagreeable animal, a savage animal, an animal that growled and grunted sometimes, and talked sometimes, and lived in London, and walked about the streets, and wasn't made a show of, and wasn't led by anybody, and didn't live in a menagerie, and was never killed in a market, and was not a horse, or an ass, or a cow, or a bull, or a tiger, or a dog, or a pig, or a cat, or a bear. At every fresh question that was put to him, this nephew burst into a fresh roar of laughter, and was so inexpressibly tickled that he

was obliged to get up off the sofa and stamp. At last the plump sister, falling into a similar state, cried out:

"I have found it out! I know what it is, Fred! I know what it is!"

"What is it?" cried Fred.

"It is your Uncle Scro-o-o-o-oge!" Which it certainly was.

LESSON IX.

A Letter to Thackeray from Dickens.

March 23, 1855.

My Dear Thackeray—I have read in the *Times* today an account of your last night's lecture, and cannot refrain from assuring you in all truth and earnestness that I am profoundly touched by your generous reference to me. I do not know how to tell you what a glow it spread over my heart. Out of its fulness I do entreat you to believe that I shall never forget your words of commendation. If you could wholly know at once how you have moved me and how you have animated me, you would be the happier. I am certain. Faithfully yours ever,

CHARLES DICKENS.

LESSON X.

A Letter to Dr. John Brown.

(Written by Thackeray.)

Palace Green, September 23, 1863.

My Dear J. B.—I am very glad you like my little Min; with her and her sister I have led such a happy life that I am afraid almost as I think of it lest any accident should disturb it. We three get on so comfortably together that the house is not the house when one is away.

I have done no work for a whole year, and must now set to at this stale old desk, or there will be no beef and mutton. . . . Instead of writing to you, why am I not writing the history of Denis Duval, Esq.? . . . Good-bye, my dear J. B. My love to the children.

Your grateful old friend, W. M. T.

7B

LESSON I.

A Letter to Louisa May Alcott from Her Mother.

Cottage in Concord.

Dear Daughter—Your tenth birthday has arrived. May it be a happy one, and on each returning birthday may you feel new strength and resolution to be gentle with sisters, obedient to parents, loving to every one, and happy in yourself.

I give you the pencil-case I promised, for I have observed that you are fond of writing, and wish to encourage the habit.

Go on trying, dear, and each day it will be easier to be and do good. You must help yourself, for the cause of your little troubles is in yourself; and patience and courage only will make you what mother prays to see you—her good and happy girl.

Lesson II.

(Difficult Words—Peninsula, Hindustan, varied, scenery, enormous, Asiatic, Continent, Himalaya, Seattle, Cape Comorin, wedged, Panama Canal.)

India.

The great peninsula of Hindustan is a country almost half as large as the United States, and quite as varied in its scenery and character. The land is enormous. It extends from the southern part of the Asiatic Continent in the shape of a great triangle, whose base is the Himalaya Mountains, and whose sharp apex lies within a few degrees of the Equator. If you could lift up Hindustan, and lay it upon North America with its western end at Seattle, it would reach as far east as Montreal, and Cape Comorin, which tips the apex, would be wedged into the Panama Canal. From north to south it is as long as the distance from the middle of Hudson Bay to the Gulf of Mexico, and from east to west it extends as far as the distance from the Atlantic Ocean to the Great Salt Lake.—(From Carpenter's "Asia.")

Lesson III.

How Wool Is Obtained.

The term *wool* is applied to the fleece of the sheep, also to the silky covering of the llama and alpaca, and to the fine hair of the Cashmere goat.

The first thing to do is to wash the sheep; for, in their wanderings over the hills, thorns and thistles and quantities of dust gather in their fleece. They are driven into a shallow stream, on a warm day in June or July, and thoroughly washed, a process to which they strongly object. They are then allowed to run around in a clean place until their fleece is dry.

The fleece is then cut off with large shears, and, when examined, it is found to be composed of hairs of different lengths, each hair somewhat curly, and having uneven edges. For this reason the fleece is carefully sorted, the long hairs being separated from the short ones.

After a second washing, the hairs are straightened by the use of the wool-comber, which is made of iron and has sharp pointed teeth.

Finally, the wool fibres or threads are spun and woven into cloth by means of machinery.—(From "Talks About Common Things.")

Lesson IV.

An Extract from Louisa Alcott's Diary.

(Written when she was ten years old.)

September 1st—I rose at five and had my bath. I love cold water! Then we had our singing lesson with Mr. Lane. After breakfast I washed dishes, and ran on the hill till nine, and had some thoughts—it was so beautiful up there. Did my lessons—wrote and spelt and did sums; and Mr. Lane read a story, "The Judicious Father": How a rich girl told a poor girl not to look over the fence at the flowers, and was cross to her because she was unhappy. The father heard her do it, and made the girls change clothes. The poor one was glad to do it, and he told her to keep them. But the rich one was very sad; for she had to wear the old ones a week, and after that she was good to shabby girls. I liked it very much, and I shall be kind to poor people.

LESSON V.

A Paragraph from John Burroughs.

One summer a wild rabbit came up within a few feet of my neighbor's house, scooped out a little place in the turf, and reared her family there. I suppose she felt more secure from prowling cats and dogs than in the garden or vineyard. My neighbor took me out to let me into her secret. He pointed down to the ground a few feet in front of us and said, "There it is." I looked and saw nothing but the newly mown turf with one spot the size of my two hands where the grass was apparently dead. "I see no rabbit nor any signs of a rabbit," I replied. He stooped to this dry spot and lifted up a little blanket or carpet of matted dry grass and revealed one of the prettiest sights I had ever seen, and the only one of the kind I had ever looked upon!—four or five little rabbits half the size of chipmunks, cuddled down in a dry fur-lined nest. They did not move or wink, and their ears were pressed down close to their heads. My neighbor let the coverlet fall back, and they were hidden again as by magic.

LESSON VI.

A Stanza from the Poem Called "Columbus," by Joaquin Miller, the California Poet Who Died Recently.

Behind him lay the gray Azores,
  Behind, the Gates of Hercules;
Before him not the ghost of shores,
  Before him only shoreless seas.
The good mate said, "Now must we pray,
  For lo! the very stars are gone.
Speak, admiral, what shall I say?"
  "Why, say, 'Sail on! sail on! and on!'"

. . . . . .

Then, pale and worn, he kept his deck,
  And peered through darkness. Ah, that night
Of all dark nights! and then a speck—
  A light! A light! A light! A light!
It grew a starlit flag unfurled!
  It grew, to be Time's burst of dawn.
He gained a world; he gave that world
  Its grandest lesson: "On! and on!"

LESSON VII.

An Extract from Miss Alcott's Journal.

(Written when she was thirteen.)

Hillside.

March, 1846—I have at last got the little room I have wanted so long, and am very happy about it. It does me good to be alone, and mother has made it very pretty and neat for me. My work-basket and desk are by the window, and my closet is full of dried herbs hat smell very nice. The door that opens into the garden will be very pretty in summer, and I can run off to the woods when I like.

I have made a plan for my life, as I am in my teens, and no more a child. I am old for my age, and don't care much for grils' things. People think I'm wild and queer; but mother understands and helps me. I have not told any one about my plan; but I'm going to *be* good. I've made so many resolutions, and written sad notes, and cried over my sins, and it doesn't seem to do any good! Now I'm going to *work really,* for I feel a true desire to improve, and be a help and comfort, not a care and sorrow, to my dear mother.

Lesson VIII.

Description of the Old Seaman—From "Treasure Island."

I remember him as if it were yesterday, as he came plodding to the inn door, his sea-chest following behind him in a hand-barrow; a tall, strong, heavy, nut-brown man; his tarry pig-tail falling over the shoulders of his soiled blue coat; his hands ragged and scarred, with black, broken nails, and the saber cut across one cheek, a dirty, livid white. I remember him looking round the cove and whistling to himself as he did so, and then breaking out in that old sea-song that he sung so often afterward:

"Fifteen men on the dead man's chest—
Yo-ho-ho, and a bottle of rum!"

in the high, old tottering voice that seemed to have been tuned and broken at the capstan bars. Then he rapped on the door with a bit of stick like a handspike that he carried, and when my father appeared, called roughly for a glass of rum. This, when it was brought to him, he drank slowly, like a connoisseur, lingering on the taste, and still looking about him at the cliffs and up at our signboard.—Stevenson.

Lesson IX.

Quotations from Shakespeare.

Neither a borrower nor a lender be:
For loan oft' loses both itself and friend,
And borrowing dulls the edge of husbandry.
This above all—to thine own self be true;
And it must follow as the night the day,
Thou canst not then be false to any man.

There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows, and in miseries.

Lesson X.

Our Field—From Mrs. Ewing's Stories.

We had all kinds of games in Our Field. Shops—for there were quantities of things to sell—and sometimes I was a moss merchant, for there were ten different kinds of moss by the brook; and sometimes I was a jeweler, and sold daisy-chains and pebbles, and coral sets made of holly berries, and oak-apple necklaces; and sometimes I kept provisions, like earth-nuts, and mallow-cheeses, and mushrooms; and sometimes I kept a

flower-shop, and sold nosegays and wreaths, and umbrellas made of rushes. I liked that kind of shop, because I am fond of arranging flowers, and I always make our birthday wreaths. And sometimes I kept a whole lot of shops, and Richard and Sandy bought my things, and paid for them with money made of elder-pith, sliced into rounds. The first shop I kept was to sell cowslips, and Richard and Sandy lived by the brook, and were wine merchants, and made cowslip wine in a tin mug.

8A

Lesson I.

(One of Miss Alcott's letters written to her mother after the publication of her first little book, "Flower Fables.")

20 Pinckney St., Boston,
Dec. 25, 1854.
(With "Flower Fables.")

Dear Mother—Into your Christmas stocking I have put my "first-born," knowing that you will accept it with all its faults (for grandmothers are always kind), and look upon it merely as an earnest of what I may yet do; for, with so much to cheer me on, I hope to pass in time from fairies and fables to men and realities.

Whatever beauty or poetry is to be found in my little book is owing to your interest in and encouragement of all my efforts from the first to the last; and if ever I do anything to be proud of, my greatest happiness will be that I can thank you for that, as I may do for all the good there is in me; and I shall be content to write if it gives you pleasure.

Jo is fussing about;
My lamp is going out.

To dear mother, with many kind wishes for a happy New Year and merry Christmas.

I am ever your loving daughter, Louy.

Lesson II.

Quotation from Webster.

While the Union lasts we have high, exciting, gratifying prospects spread out before us, for us and our children. Beyond that, I seek not to penetrate the veil. God grant that in my day, as least, that curtain may not rise! God grant that on my vision never may be opened what lies behind! When my eyes shall be turned to behold, for the last time, the sun in heaven, may I not see him shining on the broken and dishonored fragments of a once glorious Union, on States dissevered, discordant, belligerent; on a land rent with civil feuds, or drenched, it may be, in fraternal blood. Let their last feeble and lingering glance rather behold the gorgeous ensign of the Republic, now known and honored throughout the earth, still full high advanced, its arms and trophies streaming in their original luster, not a stripe erased or polluted, nor a single star obscured; bearing for its motto . . . "Liberty and Union, now and forever, one and inseparable."—Daniel Webster.

Lesson III.

Long ago the Roses used to grow on bushes that had no thorns. But the Squirrels and Mice used to climb after them, the cattle used to knock them off with their horns, the Possum would twitch them off with his long tail, and the Deer, with his sharp hoofs, would break them down. So the Brierbrush armed itself with spikes to protect its roses and declared eternal war on all creatures that climbed trees, or had horns, or hoofs, or long tails. This left the Brierbrush at peace with none but Molly Cottontail, who could not climb, was hornless, hoofless, and had scarcely any tail at all.

In truth the Cottontail had never harmed a Brierrose, and having now so many enemies the Rose took the Rabbit into especial friendship, and when dangers are threatening poor Bunny he flies to the nearest brierbrush, certain that it is ready, with a million keen and poisoned daggers, to defend him.—Ernest Seton-Thompson.

Lesson IV.

My Little Gentleman—From Miss Alcott's "My Boys."

No one would have thought of calling him so, this ragged, barefooted, freckle-faced Jack, who spent his days carrying market-baskets for the butcher, or clean clothes for Mrs. Quinn, selling chips, or grubbing in the ash-heaps for cinders. But he was honestly earning his living, doing his duty as well as he knew how, and serving those poorer and more helpless than himself, and that is being a gentleman in the best sense of that fine old word. He had no home but Mrs. Quinn's garret; and for this he paid by carrying the bundles and getting the cinders for her fire. Food and clothes he picked up as he could; and his only friend was little Nanny. Her mother had been kind to him when the death of his father left him all alone in the world, and when she, too, passed away, the boy tried to show his gratitude by comforting the little girl, who thought there was no one in the world like her Jack.

Lesson V.

A Letter from Miss Alcott's "Little Women."

My Dearest Mother—It is impossible to tell you how happy your last letter made us, for the news was so good, we couldn't help laughing and crying over it. How very kind Mr. Brooke is, and how fortunate that Mr. Laurence's business detains him near you so long, since he is so useful to you and father.

The girls are all as good as gold. Jo helps me with the sewing, and insists on doing all sorts of hard jobs. I should be afraid she might overdo, if I didn't know that her "moral fit" wouldn't last long. Beth is as regular about her tasks as a clock, and never forgets what you told her. She grieves about father, and looks sober, except when she is at her little piano. Amy minds me nicely, and I take great care of her. She does her own hair, and I am teaching her to make buttonholes and mend her stockings. She tries very hard, and I know you will be pleased with her improvement when you come. Mr. Laurence watches over us like a motherly old hen, as Jo says; and Laurie is very kind and neighborly. He and Jo keep us merry, for we

get pretty blue sometimes, and feel like orphans, with you so far away. Hannah is a perfect saint; she does not scold at all, and always calls me Miss "Margaret," which is quite proper, you know, and treats me with respect. We are all well and busy; but we long, day and night, to have you back. Give my dearest love to father, and believe me, ever your own

"MEG."

LESSON VI.

A Boy's Letter—From Miss Alcott's "Little Women."

Dear Jo—What ho! Some English girls and boys are coming to see me tomorrow and I want to have a jolly time. If it's fine, I'm going to pitch my tent in Longmeadow, and row up the whole crew to lunch and croquet—have a fire, make messes, gypsy fashion, and all sorts of larks. They are nice people, and like such things. Brooke will go, to keep us boys steady, and Kate Vaughn will play propriety for the girls. I want you all to come; can't let Beth off, at any price, and nobody shall worry her. Don't bother about rations—I'll see to that, and everything else—only do come, there's a good fellow!

"In a tearing hurry,
Yours ever, Laurie."

LESSON VII.

I wandered lonely as a cloud
That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host of golden daffodils;
Beside the lake beneath the trees,
Fluttering and dancing in the breeze.

Continuous as the stars that shine
And twinkle on the milky way,
They stretched in never-ending line
Along the margin of a bay:
Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.—Wordsworth.

LESSON VIII.

The Vase of Clay—By Jean Aicard.

One bright morning, upon his wheel, which turns to the rhythmic motion of his foot, Jean sets himself to model a vase, the vase which he has long seen with his mind's eye.

The horizontal wheel turns like a sun to the rhythmic beating of his foot. The wheel turns. The clay vase rises, falls, swells, becomes crushed into a shapeless mass, to be born again under Jean's hand. At last, with one single burst, it springs forth like an unlooked for flower from an invisible stem.

It blooms triumphantly, and the old man bears it in his trembling hands to the carefully prepared furnace where fire must add to its beauty of form the illusive, decisive beauty of color.

Lesson IX.

A Letter—From a Story by E. V. Lucas.

To Miss Alison Muirhead:

Dear Madam—We beg to inform you that, in accordance with the last will and testament of our client, the late Mr. James Thomson, there lies at our office, a packet containing a thousand threepenny bits, being a legacy which he devised to yourself, free of duty, in a codicil added a few days before his death. We should state that, by the terms of the bequest, it was our client's wish that five hundred of the threepenny bits should be spent by you for others within a year of its receipt, and not put away against a maturer age; the remaining five hundred he wished to be spent by yourself, for yourself, and for yourself alone, also within the year. The parcel is at your service whenever it is convenient to you to call for it.

We are, dear madam, Yours faithfully, Lee, Lee & Lee.

(This was written to a little girl who met old Mr. Thomson in a park.)

Lesson X.

One of Æsop's Fables.

A Fox was boasting to a Cat of its clever tricks for escaping its enemies. "I have a whole bag of tricks," he said, "which contains a hundred ways of escaping my enemies." "I have only one," said the Cat; "but I can generally manage with that."

Just at that moment they heard the cry of a pack of hounds coming toward them, and the Cat scampered up a tree and hid herself in the boughs.

"This is my plan," said the Cat. "What are you going to do?"

The Fox thought first of one way, then of another; and while he was thinking the hounds came nearer and nearer, and the Fox was caught by the hounds and soon killed by the huntsmen.

Miss Puss, who had been looking on, said, "Better one safe way than a hundred on which you cannot reckon."

8B

Lesson I.

Description of Barnaby Rudge—By Dickens.

He was about three and twenty years old, and though rather spare, of a fair height and strong make. His hair, of which he had great profusion, was red, and hanging in disorder about his face and shoulders, gave to his restless looks an expression quite unearthly—enhanced by the paleness of his complexion and the glassy lustre of his large protruding eyes. Startling as his aspect was, the features were good, and there was something even plaintive in his wan and haggard aspect. . . .

His dress was of green, clumsily trimmed here and there—apparently by his own hands—with gaudy lace; brightest where the cloth was most worn and soiled, and poorest where it was at its best. A pair of tawdry ruffles dangled at his wrists, while his throat was nearly bare. He had ornamented his hat with a cluster of peacock's feathers, but they were limp and broken, and now trailed negligently down his back. Girt to his side was the steel hilt of an old sword without blade or scabbard; and some

party-colored ends of ribbons and poor glass toys completed the ornamental portion of his attire. The fluttered and confused disposition of all the motley scraps that formed his dress bespoke, in a scarcely less degree than his eager and unsettled manner, the disorder of his mind. . . .

LESSON II.

Narration.

John Burroughs tells a story of a little wild mouse—a jumping mouse—that a boy caught and took to his teacher in New York. It began to hibernate early in November.

She (the teacher) made a pocket for it in a woolen sock, but it was not suited with it, for in January it woke up and made itself a neat little blanket from the wool which it nibbled from the sock. In this it rolled itself and went to sleep again. A week or two later I was at the school, and the teacher showed me her sleeping mouse. It was rolled up in a ball, with its tail wrapped about its head. I held it in the palm of my hand. It seemed almost as cold as a dead mouse, and I could not see it breathe. It was carefully put back in its blanket.

When the warm weather came on, she uncurled and ate and drank. She preferred pecan nuts and shredded-wheat biscuit, and ate corn.

LESSON III.

Exposition.

Flax is a plant from two to three feet in height, with small pointed leaves and blue flowers. The stems are very peculiar, being hollow and covered with fibrous material.

Flax is prepared in the following way: The stalks are pulled up and tied in bundles to dry; then they are steeped in water until softened so that the fibres of the outside covering or bark can be separated. After being dried in the sun, any woody portion of the plant which may adhere to the fibres is removed by an instrument called a *brake.* To prepare the flax for the spinning machine, the fibres must be laid out straight. This is done with a *hatchel,* a contrivance resembling a brush, with sharp pointed needles on it where the bristles are usually found. The flax is drawn over these points, and the long fibres become straight. The short, uneven ones are left, and make a substance called *tow.*

These fibres are converted into cloth by spinning and weaving machines. Flax fibres are of a brownish color, and have to be bleached before the beautiful white color of linen can be obtained. The quickest way to accomplish this is to use chloride of lime.—From "Talks About Common Things."

LESSON IV.

A Letter.

Dear Mrs. Dodge—A little cousin, thirteen years old, has written a story and longs to see it in print. It is a well-written bit and pretty good for a beginner, so I send it to you hoping it may find a place in the children's corner. She is a grandchild of S. J. May, and a bright lass who paints nicely and is a domestic little person in spite of her budding achievements. Good luck to her!

I hoped to have had a Christmas story for some one, but am forbidden to write for six months, after a bad attack of vertigo. So I give it up and take warning. All good wishes for the New Year.

From yours affectionately, L. M. Alcott.

Lesson V.

And what is so rare as a day in June?
Then, if ever, come perfect days;
Then Heaven tries the earth if it be in tune,
And over it softly her warm ear lays.
Whether we look, or whether we listen,
We hear life murmur, or see it glisten;
Every clod feels a stir of might,
An instinct within that reaches and towers,
And, groping blindly above it for light,
Climbs to a soul in grass and flowers.

—From Lowell's "The Vision of Sir Launfal."

Lesson VI.

A Paragraph from John Fiske's "The War of Independence."

The famous Federal Convention met at Philadelphia in May, 1787, and remained in session four months, with Washington presiding. Its work was the framing of the government under which we are now living, and in which the evils of the old confederation have been avoided. The trouble had all the while been how to get the whole American people *represented* in some body that could thus rightfully tax the whole American people. This was the question which the Albany Congress had tried to settle in 1754, and which the Federal Convention did settle in 1787.

Lesson VII.

A Geographical Paragraph.

A very great number of the streets in Genoa are footways merely, and these are as narrow, as dark, as full of jutting chimney-places, balconies, and opened window-shutters, and as picturesque as the little alleys in Venice. They wander at will around the bases of the gloomy old stone palaces, and seem to have a vagabond fondness for creeping down to the port, and losing themselves there in a certain cavernous arcade which curves round the water with the flection of the shore, and makes itself a twilight at noonday. Under it are clangorous shops of ironsmiths, and sizzling shops of marine cooks, and, looking down its dim perspective, one beholds chiefly sea-legs coming and going, more or less affected by strong waters; and as the faces to which these sea-legs belong draw near, one discerns sailors from all parts of the world—tawny men from Sicily and Norway, as diverse in their tawniness as olive and train-oil; sharp faces from Nantucket and from the Piraeus, likewise mightily different in their sharpness; blond Germans and blond Englishmen; and now and then a colored brother also in the seafaring line, with sea-legs, also, more or less affected by strong waters like the rest.

—From W. D. Howells' "Italian Journeys."

Lesson VIII.

A Paragraph from Civics (Exposition).

(A Part of Article XII of the Amendments to the Constitution.)

The Electors shall meet in their respective States and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the President of the Senate;—the President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted;—the person having the greatest number of votes for President, shall be the President, if such number be a majority of the whole number of Electors appointed; and, if no person have such majority, then, from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President.

Lesson IX.

From Miss Alcott's Journal.

November 29th—My birthday. Felt forlorn so far from home. Wrote all day. Seem to be getting on slowly, so should be contented. To a little party at the B's in the eve. May looked very pretty, and seemed to be a favorite. The boys teased me about being an authoress, and I said I'd be famous yet. Will if I can, but something else may be better for me.

Found a pretty pin from father and a nice letter when I got home. Mr. H. brought them with letters from mother and Betty, so I went to bed happy.

Lesson X.

A Business Letter or Note—From "Barchester Towers," by Anthony Trollope.

My dear Mr. Harding—Will you favor me by calling on me at the palace tomorrow morning at 9:30 a. m. The bishop wishes me to speak to you touching the hospital. I hope you will excuse my naming so early an hour. I do so as my time is greatly occupied. If, however, it is positively inconvenient to you, I will change it to 10. You will, perhaps, be kind enough to let me have a note in reply.

Believe me to be,

My dear Mr. Harding,

Your assured friend,

The Palace, Monday morning,
20th August, 185—.

Obh. Slope.

Mr. Harding's Reply.

Dear Sir—I will call at the palace tomorrow at 9:30 a. m. as you desire.

Truly yours,

High Street, Barchester, Monday.

S. Harding.

Composition—Oral Expression, 1A-3B

By Lydia A. Miller.

This article does not aim to be learned or infallible in the suggestions it offers in answer to certain questions which follow. Nor does it aim to be original. The suggestions have been gathered from observation of successful trials; from reports of tests given by certain teachers, at the instance of their principal, and from noticing the need for constant drill before the pupils really have a true feeling for good construction.

Question 1—How shall I correct "I didn't was, I didn't could," etc. (1 A and 1 B.)

Suggestions—The teacher asks question, What can you draw?

After sufficient drill in which about half the class have replied, "I can draw a boat," "I can draw a book," etc., the question is changed:

Can you draw a horse?

Tell some things you *cannot* draw.

"I cannot draw a go-cart." "I cannot draw a machine." Etc., etc.

There is a legitimate use of *could.*

Why could not Ada come to school? Ada could not come because she had a cold.

Perhaps you (meaning every child) were absent some day. Why could you not come to school?

I could not come because my mother took me out.

I could not come because I was vaccinated.

I could not come because I had a cold.

I could not come because my shoes were bad.

Why could not your mother come to the meeting?

My mother could not come because she couldn't leave the house.

Use of *didn't* to prevent didn't was, didn't could.

Did you go to the party on Saturday? I didn't.

Did you fall down today?

Did you see the moon this morning?

Did you have ice cream for breakfast? Etc., etc.

Can you climb a tree? I cannot————

Can you eat a stone?

Can you see through wood? Etc., etc.

Use of *have no* instead of haven't got.

Require answers to questions similar to the following, asking always for what requires a negative answer.

Have you a lion? I have no lion.

Have you no diamond? balloon? gold watch? handkerchief? (when forgotten) strawberries? (out of season) *or*

Tell something you have not; not haven't, or haven't got, or don't have.

The value of this drill is in fitting the question so that it will suggest the correct answer, and to use a superintendent's expression, the answer will incorporate the question.

Use of *has, has not.*

Has Charlie a carriage? Charlie has no———
Has Ida a fur coat? Ida has no———
Has John a horse? John has no———
Has Alice a pencil? (Forgot it.) Alice has no———
Has Abraham a paper? (Lost it.) Abraham has no———
Has not Mrs. Williams a new house? She has not a———
Has Sarah a torn dress? (Very neat.) She has not———
Has Isidor new shoes? (Highly polished.) He has not———

If the question is, "What has Ada," the answer will be affirmative and the drill will not have the same value. The value of the test is in practicing the correct form so constantly that its use becomes automatic. Though the exercises seem monotonous, they are not, as each question refers to some one in the class, and has a live interest. What Alice or John has or has not is of great interest to Mollie or Willie. Children are observing and have the ability of comparison to a great extent.

I am frequently asked to give some interesting way of correcting errors in the children's language. I can but say: Select the sentences that have a recurrence of the error, frame questions that will elicit the correct form, and get the correct form of reply so repeatedly, that the incorrect form will be smothered. So far as possible avoid showing the incorrect form to the pupils.

The art of questioning should be so studied as to make the putting of good questions habitual with a teacher. It requires skill, and because it requires skill, it is one of the items enumerated on the blanks for estimating a teacher's ability.

If a teacher says after giving a lesson on thirds, and pointing to the illustration on the blackboard, "What did we say this *was?*" she is confusing the little child. What was and is are different ideas in his mind. Again if she is careless about "who" and "whom," saying: "You are the boy *who* I meant," she is laying up trouble for that boy when he studies syntax and must give the whole grammatical history of the word. He may wedge in some irrelevant history, and quote her as authority. This would certainly be bad.

Again if she explains history by saying, "These *are* the people whom, we know, lived in America years ago," she is failing to give the pupil the feeling for nicety in language, and it is her duty to give that feeling.

When a teacher says, "I was just *after* bringing John to you," she betrays at once that she needs a little polishing herself.

So she cannot be too careful, and must choose her questions as carefully as a knife thrower must choose his safety point near, but not on, his living target.

We need not constantly be seeking new devices. The old that have stood the test are ever new to the pupils, even if trite to us. The main point is to have the *eyes* of the pupils, and behind those eyes, the "Open Sesame" to the mind, and that is, of course, the teacher's personality *plus* interest.

In correcting *brought* for *brang,* the question is not, What did you bring? but, Tell what you *brought.* Tell what you *sang.* Tell what you *saw.*

I brought a flower. I brought my pencil. I brought my father's lunch to him.

In correcting *written* for *wrote* the question should be, *What have* { I / you / they } written; what has { she / he } written? so that the answer *must* include the *have* or *has* (or later *had*) with *written.*

Suppose you wish to correct *saw* for *seen,* shall you say, What did John see? Not if you wish to accomplish your purpose, but Tell what *you* saw; John saw; Alice saw; etc.

Similarly, after a time, *have* or *has seen.* What have you seen? What great picture have you seen? What great building have you seen? What kind of children have I seen today?

Exercise in getting children to greet each other and their teacher without embarrassment.

We are going to play there is a party. It is Ella's party and she has invited all the children to come. Step up children and let Ella greet you. It isn't polite to crowd or push. Ella must take each little hand and say, "How do you do, John? I am glad you have come." "How do you do, Alice? I am glad to see you." They respond, "Thank you, Ella, I am well. I am glad you asked me to your party." It may seem strange to have to teach children simple social duties, but I have seen some very awkward greetings exchanged between elementary school graduates. A great deal is said about being "schooled" to bear trials, but trials may be few, and social obligations will be many. To be "schooled" to enter with ease and sprightliness into the pleasures of a social evening seems to me far more necessary, and the children will be grateful to have been tided over an embarrassing moment, when perhaps their self-consciousness might have paralyzed them, but when the few little drills at school helped them to do the right thing.

Exercise on *drew* for "drawed." Children are sent to the board to draw what they like. They are then asked to turn to the class and tell about it, the teacher giving the cue, by drawing something, pointing to it and saying, "*I* drew a circle." Each one in turn is encouraged to say, "I drew a cat," "I drew a square," etc., etc.

The teacher asks: "What has Alice drawn?" "Alice has drawn a leaf," etc., etc.

Others go. They draw. Further questions: "What is Alice drawing?" "She is draw—ing a leaf." (Insisting upon careful pronounciation [no *r* sound] and careful enunciation—full value of *ing.*)

A few days later: "What was drawn on the board on Tuesday?" "A leaf was drawn," etc., etc.

Many irregular verb forms will lend themselves to the above plan of development.

Question 2—How shall I get the pupils to express themselves in sentences? (1 A to 3 B.)

Incentives—(a) Relating experiences.

1. Yesterday I wheeled the baby cart.
2. I patted a dog.
3. I rode on a wagon.
4. I went to the store for my mother.
5. A little bird once flew into our room.

The teacher starts the ball by saying, Yesterday I wrote a letter to my friend. Tell me something you did.

(b) Expressing likes. The teacher always *helps* by suggestion. I like a big, red rose. I like a nice, long walk. I like a beautiful picture. I like candy.

The children will clamor to tell what they like, and they must use sentences to express what is in their minds. Single words will not tell the story.

(c) Describing in words some simple pantomime:

The teacher says the class is going to play a new game, then she calls an *apt* pupil to her. She whispers to him to write on the board; she whispers to a little girl to laugh; she whispers to another to sing "Little Pussy." The children tell what is done. What did John do? Mary? Ida?

Then the children called on are allowed to perform some act that pleases them. The children tell with great glee what is done. Tom cried. Rachel picked up a pin. Ada walked on tip-toes. Mary shut her eyes.

The children in turn ask the teacher to do certain things:

Please read, Miss Brown. Please tell a story. Please sing. Please play with us.

The children ask fellow pupils to do certain things:

Harry, walk two steps. Charlie turn to the wall, etc.

Summary for oral expression:

1. Frame questions so that the answer is embodied.
2. Repeat no child's answer.
3. Make pupil repeat to be heard.
4. Insist upon sentence answers.
5. Encourage truthfulness.
6. Have exercises full of spontaneity.

Question 3—How shall I get my pupils to enunciate clearly and correctly?

Enunciation (1A—3B).

The teacher must understand the structure of the vocal organs.

She must enunciate clearly herself.

She must understand the process of making every sound in the language.

She must see that the children's voices are as clear as can be made after use of handkerchiefs.

She must encourage the pupils to drink water often.

She must give them good breathing exercises, having them face open windows during the exercises.

She must protect the pupils from draughts, and prevent sudden changes of temperature

Before every reading lesson there should be a breathing exercise, and the singing of a half a dozen scales.

Just as the most concentrated effort in spelling comes during the regular spelling lesson, so the most effective work in enunciation comes during the reading period, when the thoughts are all expressed, need not be found or formed, and it is the duty of the child only to read clearly and intelligently.

The little foreigner who attaches a *k* or *g* sound to the nasal *ing* must be shown how to make that English sound in an English way in his little Russian throat, by contract of palate and tongue. The saliva must be gotten rid of, the pupil must be told to form a bridge of his tongue and press it against the roof of the mouth, and then he must imitate the teacher closely while she enunciates *sing, ring, bring,* etc. Nothing but individual attention will bring practical and lasting results. Difficulties as with hang over, hanging, etc., must each be treated separately, and studied carefully.

The *th* and *u* sounds give less trouble, but must be closely watched.

I have found that stammering, if not too great, can be prevented if the stammerer is warned every time he is to speak, to take a *long breath* and then talk. This plan is also helpful to those who have a nervous swallowing habit.

III. First Steps in Composition (3A—3B).

In answer to question: How can I help my pupils to understand the paragraphs?

(a) Recognition of sentence. Which are sentences?

I once saw an Indian
roller skates
in a great crowd
Four boys went to the woods together. Etc., etc.

How do we know a sentence? It tells a story.

How does it begin? How does it end?

(b) Further drill:

Write many simple sentences and many broken phrases on the board and have pupils separate into:

Sentences. *Not sentences.*

This exercise is to be done at the board, but by pupils. Correct mistakes as needed.

(c) Exercise similar on paper. The teacher vigilant and very exacting in having sentences properly begun and ended.

(d) Children describe an object in two sentences.

I am thinking of an animal. It has long, curly hair.

Other pupils guess what it is, and give answer in single sentence.

1. I am thinking of an animal.
   It has long, curly hair. } It is a dog.

2. I am thinking of a flower.
   It has a yellow center and white fringe. } It is a daisy.

3. I am thinking of a boy.
   He has blue eyes and short, black hair. } It is Charlie.

Etc., etc.

Test—Dictate a description, having always before the pupils the descriptions already given. If the pupils have formed only one sentence, show them where the break comes. Have them rewrite correctly.

Test further with more descriptions.

Experience:

Last night I went to bed at eight o'clock. This morning I awoke at half past seven.

How many sentences?

My mother sent me to the store. I bought bread and rolls.

How many sentences?

Dictate—I like bread and butter. It is good for me. Correct.

I took a walk yesterday. I saw the sun go down. Test and correct.

Our school is very large. It has many classes. Test and correct.

If the class is slow much practice both in copying and in dictation will be necessary.

It may be a question whether to introduce a third sentence into the paragraph, or to introduce the interrogative sentence. Probably the easier step will be the introduction of the third sentence.

My dog is black and white. It has a short tail. I call him Jip.

This may be studied from the board. Red crayon may bar the end of each sentence. Blue crayon may underscore the initial capitals.

Many such paragraphs may be studied from the black board.

The same paragraphs may be dictated.

The children may tell of their pets, using three sentences. (Called "stories.")

These may, with whatever corrections are necessary, be placed on the board for further study.

The pupils may copy the one they like best.

This paper has aimed only to take up the most common difficulties young teachers find in gathering up the threads of their work. Their weakness lies in not putting themselves in the place of their pupils, in expecting those pupils to know what nothing in their environment teaches them, and in presenting too many problems at one time. The subject of composition is ably treated in so many good text books, it were presumption for inexperience to enter the field, but the few thoughts herein given have been found helpful, and may be helpful again.

Correspondence and Suggestive Letters —1A-8B

By Lydia A. Miller.

It is my belief that as soon as children have a desire to write letters, they should be encouraged to write, no matter what the age. Mrs. Longfellow had her little daughters assist her when she wrote letters. Most probably little dimpled fingers also made an attempt at correspondence. And everyone knows how delighted father or grandma or aunt or some other admiring relative is when the "baby" sends a letter. It is, then, not foolish to show the ambitious little ones the correct way and the best way to do this.

There is so much to learn about the courtesy of writing that this paper can but give the A, B, C of it. With letter writing, as with other subjects, the teacher must use the means she employs to hold the pupils' interest—she must grasp the first and best opportunity of presenting the subject. A nicely written note from a mother to the teacher on the occasion of her child's return after an unavoidable absence may be the right introduction. She may thank the little girl openly before the pupils for the nice note, and many eyes will look from note to child and back to note with admiration, since the teacher praises. The teacher lays the note away, and says no more about it. The next day there are more nice notes. Big sister or brother has been impressed into writing the teacher on some subject near to the impressionable child's heart.

But, leaving the subject of means and ways for the present, let there be a brief survey of the facts of letter writing.

Children should bring discarded envelopes, that have postage and post stamps—in fact, have actually been through the mails. The talk on letter writing will recall how letters are sent, who pays for the delivery, how work can be made easier for the postman.

Directions—(1) Letters should be plainly addressed well below the horizontal middle. Why? So that the postal stamp may not cover or blur the address.

(2) There should be Sufficient postage and in the right place, so that the receiver may not be embarrassed by having to pay. It is discourteous to make friends pay for a message. If the postage stamp is in any place but the upper right hand corner of the front side of the envelope, the letter may be thrown out and delayed in delivery.

Letters from the ignorant and foreign are sometimes wrongly stamped.

(3) The writer is urged to have his address in the upper left corner, in case of the non-delivery of letter, that it may be returned by the postal authorities.

(4) A careful choice of stationery should be made.

(a) White or cream paper and envelopes are preferred.

(b) The paper now used is unruled.

(c) The accepted size for polite social correspondence envelope is 3¼ inches or 3½ inches by 5¼ inches or 5½ inches. An envelope smaller than that, say the people at the post office, is very apt to make trouble in the stamping machine.

The paper is nearly twice as wide as the envelope, but not quite so long, that it may, after being folded, fit comfortably inside the envelope.

(d) Paper and envelope should match.

(e) Business envelopes are about 3⅛ inches by 6¼ inches.

(f) If the business paper used is unfolded, the custom is to fold it crosswise once, and then lengthwise twice.

Fold so that the receiver on unfolding may have the opened letter in position for reading.

(5) The social letter should be placed in the envelope with edges down, so that removal from envelope will be easy.

Business letters should be placed in the envelope with long edges to the back, and short edge along the farther side, so that the receiver on opening with his paper cutter may slip the letter out easily and have it in position for reading at once upon unfolding. Of course, all letter edges should come together to a nicety, and creases should be smooth, clean and even.

(6) If information not ultimately to the advantage of the sender is asked for, a stamp for return letter should be enclosed. A prospective patron or purchaser is not expected to enclose postage; a person asking for reference, introduction, advice, signature, or the like. should always enclose postage; in fact, may with courtesy send a stamped addressed envelope, so as to give as little trouble as possible to the recipient of the request.

(7) Reply to letters.—Judge if a letter requires an answer.

(a) An invitation should be acknowledged and either accepted or declined within two days.

(b) A gift should be acknowledged as soon as received.

(c) A letter asking for recommendation, introduction, reference should also be promptly answered.

(d) A letter from a distant land should have prompt reply, because it takes so long for delivery.

(e) A letter from an ill person. A call is kinder.

(f) One from a person bereaved or in distress. Call.

(g) One congratulating a friend should immediately follow the happy event.

By "anticipating" courtesy and thanking for it, a letter of thanks in some cases may be omitted, especially where the recipient has solicited by "call or write" in his advertisement.

(8) Contents of letters.—Social—Pleasant news, requested information, incidents of interest to recipient, sympathetic inquiries about those who have been ill or in trouble, temperate account of one's own difficulties and work (where this is of interest); transcription of some bright or witty account, newspaper story or remark not likely to come into the experience of the receiver of the letter.

Business—Plain, simple, few words, no private information, suppression of lament or trouble; brisk, hopeful, courteous but not humble. No voluntary self-praise; rather let employer discover for himself.

(9) Replies.—To cover inquiries, but in respect to social letters, to do

somewhat more. To give cheerful view, if possible; if not, to dwell as lightly as one can upon the unpleasant. To give courtesy for discourtesy, dignity for abuse.

(10) Complaints.—Never abusive. Not written in the heat of anger, because rash or foolish or unkind things may be said, which after deliberation would be repented of and yet stand to the everlasting embassassment and chagrin of the writer. Let such always follow deliberation, and be written as if by a third person who may have judgment with sympathy, but has no other interest in either abuser or abused.

(11) Thanks.—In the matter of gift, find some good use for it. The gift was the expression of kindly feeling and interest; therefore it should be received with grace and gratitude. State pleasure in the gift, the use it will be. Be sincere but not gushing.

(12) Request.—It should be reasonable tactful and allow time for fulfillment.

(13) Form of address.—It should be accurate and correctly spelled. No person likes to receive a letter with his name wrongly spelled: John for James, Reed for Reid, etc. It should have the correct title and accord due respect to the person addressed.

(14) Atmosphere of letter.—Write as if the person to whom you write actually sat or stood beside you. Have the letter alive with smiles, bright looks, animation, cheer.

Oliver Wendell Holmes was once asked why he wrote so few letters, as he could write so delightfully. He averred that he would not waste his reader's time with an empty letter, and yet did not often have the opportunity to write a worthy one.

In closing, always be sincerely, respectfully, truly, hopefully—something, whether friend, son, niece, cousin, servant.

To a superior { Respectfully / Obediently } yours

To a relative { Affectionately / Lovingly / Fondly / Trustingly

To a friend { Sincerely / Gratefully / Cordially } yours

To a parent { Affectionately / Obediently / Hopefully

Never, "I am your son," "I am your friend," "I remain your brother," etc. These are too cold and meaningless.

It would seem as if everyone knew how to close a letter correctly, but it is sometimes surprising how very easily young students fall into error. That the sentence, *I remain,* etc., should form part of the final paragraph, and that *"affectionately yours"* should have a line all its own half way across the page are facts which are daily to be taught. I have seen

Your loving
Son John

and similar crudities. That the name of the writer should have the dignity of a line all its own, must be told again and again. The spelling of *truly, sincerely, cordially,* is not always above reproach.

In a certain school the children of all classes above 3A were given a prepared form of invitation to a parents' meeting to copy. Children in lower classes begged to write one, too, and so a simpler form was prepared for them. Even the 1B pupils partook of the pleasure, and gleefully carried home their large, roundly written invitations as follows:

Dear Mother and Father:

Please come to our Parents' Meeting on Thursday afternoon.

Your loving son, Theodore.

On the occasion of a class party, with the teacher's help, they formulated:

Dear Ida:

Please come to our class party at 2 o'clock in Room 210. There will be games and refreshments.

Your loving friend, ——— ———.

Some 2A children wished to learn to dance for the Arbor Day celebration. Their teacher directed them to write to the principal. With a little help they formulated:

Dear Principal:

May our 2A class dance at the Arbor Day exercises?

Respectfully yours,

A 2B boy wished to write a birthday note to his mother. The teacher helped him, and then all the boys clamored to write a letter. They composed:

Dear Mother:

I am so glad the sun is shining so brightly because it is your birthday. I hope you will have a pleasant day, and have many, many happy sunny birthdays.

Your loving little son, Eddie.

A 3A girl wished to thank the teacher for taking the class to the park, and her mother helped her to write the following:

Dear Miss C——:

Yesterday I had such a pleasant time at the park. If you had not taken us, I may never have gone. My mother is working all the time, and is too tired on holidays to go out. I loved the deer and the bears, and it was so nice on the soft grass. Thank you so much.

Your loving pupil, ——— ———.

A 3B child wished to write a letter to her aunt, thanking her for a box of chocolates. Her teacher assisted.

Dear Aunt Ida:

Thank you for the fine chocolate creams you sent me on Saturday. I shared with Hattie and John. Even mother and father each had some. We all liked them very much. I think chocolates the nicest candy, don't you? I am trying hard with my music, as you wish.

Your loving niece,

——— ———.

As letter writing will not be formally taught till the 4A class is reached, of course, the teachers in lower grades have no responsibility in the matter.

The foregoing types were called up by the needs of the occasion. Every teacher of the first three years will have bright children who wish to write letters. It rests with them whether they put the children off, saying they will learn these things in higher grades, or whether they use the occasion for a live talk close to the life of the pupil.

In the 4A class pupils begin to have an exalted sense of their importance without any foundation in knowledge. They must begin the practice of polite letter writing by mastering the forms of excuse for absence, lateness, unprepared home assignments, and the like.

GRADE 4A.

(1) Lateness.

114 Occasion Street,
Hopeville, May 3, 1912.

My Dear Miss Whiteson:

Please excuse me for being late yesterday afternoon.

I was helping mother, but she directs me to say that I could have reached school if I had hurried. I was slow and careless, but I promise to be more careful and prompt after this.

Your respectful pupil, ——— ———.

(2) Children love to tell their experiences, and it is well for them to learn how to write them in letter form:

423 Bristol St.,
Brooklyn, April 24, 1912.

Dear Cousin Lucy:

We had a great scare on Monday. While mother was hanging out the clothes, baby ran away. At about eleven o'clock I was sent for. I went home and found mother in the kitchen crying. Just then we heard a glad little shriek, and there was baby in the arms of a big boy. Just think! it had climbed to the fourth floor.

We were so glad to have baby we didn't ask many questions. Mother took her in her arms and I returned to school. But it put mother back so I had to help her when I reached home. So I couldn't meet you and Miss Scott to go to the museum. I am very sorry.

Your loving cousin, Miriam.

(3) Letter to relative away from home:

5600 Ell Street,
Brooklyn, October 12, 1912.

Dear Brother Charlie:

We are all so glad to get your letters. Life on a farm must be pleasant even if it is hard. I hope you will breathe in so much good, fresh air and stay so long in bright sunshine that you will soon be perfectly well. Tell me how the little black calf is getting along.

With love from father and mother and a whole bushel of it from myself, I am

Your interested sister, Ada.

(4) Confession of wrong doing and desire to make reparation:

115 Fulton St.,
Brooklyn, August 7, 1911.

Dear Mr. Hargreave:

Yesterday when I was playing ball in the street, I broke a pane of glass in one of your apartments which is to let.

I have a little money saved, and if you will tell me how much it costs, I will try to pay for it.

It was wrong for me to play so carelessly. I will be more careful in the future. Pardon me for the damage.

Respectfully yours,

John Angel.

GRADE 4B.

(1) Thanks for gifts.

My Dear Uncle Ned:

The skates are just splendid. I can cut fine figures with them. On Monday I skated to school. My teacher took care of the skates for me. She says I must have a very generous uncle. I think so too.

Thank you! Thank you! I mean to be an industrious boy so you may be proud of me.

Your grateful nephew,

Hillis.

(2) An experience and its consequences.

Dear Herbert:

My heart beats with fright when I think of how near I came to being run over yesterday with baby in my arms.

The boys dared me to pick her up as I skated. I picked her up easily, but I didn't see an auto coming tearing toward me till I heard the boys yell. I was three feet from the front wheel. You could have knocked me down with a feather.

Well, I gripped baby so she cried, jumped to the sidewalk and fell. But baby was only scared, and when I looked up, only a cloud of dust showed where the auto had passed. My mother heard of it, too, and there was another cloud of dust with no auto in it. But I deserved all I got, and would rather take forty whippings than have baby scared even. Never will I take such a foolish dare again!

Your silly friend,

(3) Sympathy for one hurt in a fire.

Dear Harriet:

Brother and I feel so sorry you were hurt at the fire. We are coming to see you on Sunday. Look for us at two o'clock.

I was in a hospital once. There were rows and rows of white beds, and

such sweet, dear, patient people were lying there! Standing beside almost every bed were tables on which were some beautiful flowers.

I shall bring some flowers for you, and some extra ones for those who haven't any. Mother says sick people like oranges, so I will have some of those, too.

All the boys and girls in the class are going to write to you. So cheer up! You are the most important girl in town. Keep well till Sunday.

Your loving friend, ———— ————.

GRADE 5A.

(1) Complaint of gas.

————————

The Union Gas Co., ————————

————————, ————.

Gentlemen:

My father is unable to write English, so he asked me to tell you that there is a leak in the gas pipe in our hall. One can smell the gas escaping all the time. It cannot be on the outside because we have tried and could not find it. I think it must be inside the wall. Will you kindly send some one very soon to investigate and to stop the leak. Thanking you very much for this courtesy, I am

Truly yours,

Harry Salter,
for my father, John H. Salter.

(2) Application for position advertised.

542 Howard Ave.,
Brooklyn, Nov. 3, 1911.

Mr. Harold Putnam, Contractor,
34 Broadway, New York City.

My Dear Sir:

Your advertisement in today's *Eagle* for an errand boy, attracted my attention. I am anxious to learn the building business. I must leave school very soon, as I am fourteen years old. I am large and strong and do not mind cold weather. Will you give me a chance at mason work? Thanking you for considering my application, I am

Respectfully yours,

Abraham X. Lent.

(3) Directions for finding address.

————————

————————

My Dear John:

At the last minute I find it will be impossible for me to go to the station for you on Friday. I sprained my ankle yesterday. I hasten to write directions how to come.

When you leave the Hudson Terminal at Cortlandt street, inquire the way to the subway station at Broadway and Dey street. Go down the stairs and buy a ticket (five cents), which you must drop in the box at the gate.

A man will be standing there. When a train marked Brooklyn comes, board it and ride to Borough Hall. Wait at the curb for a Fulton street car. Ride in it to Rockaway avenue and get a transfer. Board a Rockaway avenue car marked Canarsie. Tell the conductor to be sure to let you off at Glenmore avenue. When you get off the car, cross the street and walk four blocks to Stone avenue. you will see my father's sign, JACOB RAUM REAL ESTATE. and then you will know that you are at home. Now be careful and don't be run over. Carry this letter, in case you forget directions.

My ankle is getting well fast, and we shall have a jolly time.

Your old chum, Mortimer.

GRADE 5B.

(1) Learning a new game.

Dear Zack:

Don't think you're the only fellow that is learning new games. I was quite envious of your Catch Ball; we are learning End Ball, and it is great fun.

The class is divided into two sections and each section into two parts; a group that throw the ball and a group that "guard" for the other side: A, B, C, D—A and C, one side; B and D, the other.

A boy in the C group throws to his side in the A group. The B group boys try to stop the ball. If they succeed they win a point and have a throw to their side at D. Then the C people try to keep the ball, and if they succeed they have the throw. The game is very exciting if the sides are evenly matched, but even if one is not skillful, it is great fun just to throw and try to win. I was in the B, D group, and we won by five points. How many times can you chin?

Sincerely, Adolph.

(2) Request about replanting a tree:

416 Hopkinson Ave.,
April 15, 1912.

Dear Alice:

Last spring, if you remember, every child was given a catalpa tree about six inches high. I gave mine to Aunt Elsie because we have no yard or garden, and she has.

It grew finely that summer in spite of the drought and heat, and if the worms hadn't begun to eat the leaves in September, it would have looked handsome till they fell.

This spring when I saw Aunt Elsie, she showed me the tree. It has grown twice as thick and is six inches taller.

But alas! Aunt Elsie must move and will have no garden. The owner of the house is going to build a big tenement.

You have a fine, big garden out in Woodhaven. Won't you let me plant it there? Hoping you will, I am

Your affectionate cousin, ——— ———.

(3) News and request:

South Cairo, N. Y.,
April 10, 1912.

My Dear Miss ————:

You remember the good times we had singing in old Eighty-four? Well, up here in Cairo I have organized a club of young people to learn to sing.

One of the boys copies the songs from the old song book you loaned me. He made a hektograph like yours. I showed him how. It is splendid. We print all our programmes, too.

We gave a concert in County Hall on Thursday night. There were two solos, three duets and five choruses. We sang finely—at least the silver collection amounted to ten dollars. When we have earned enough we are going to buy a good phonograph. Will you find out something about them for me? Thank you very much.

Cordially yours,

———— ————.

GRADE 6A.

(1) Reply to advertisement:

————————

————————

Mr. Thomas Ashburton,
63 Broadway, New York.

My Dear Sir:

I write in answer to your advertisement for an office boy who is "apt, willing and sensible." I have just obtained my work certificate, and very much need work.

Mother thinks I am sensible because I manage the children when she is at work, and keep them out of mischief. My class teacher thinks I am apt because I am the first to understand hard questions, and answer them intelligently, and I enclose my last report card with A in effort, to show I am willing and industrious. But I feel that you must judge for yourself. Will you then kindly give me a chance to show what I can do? With thanks, I am

Respectfully yours,

Harold Wilton.

(2) Imaginary request from a bird:

Treetop, May 13, 1912.

Mr. Boy! Mr. Boy!

Look up and you will see it is only a little robin who is chirping to you. I have no ink, I have no paper, I cannot write, but I think you are kind-hearted, so I will say my letter.

Five little birds are in that cherry tree bough. Five little mouths are open wide asking for food. All day long they chirp and chirp for worms. If I failed to bring them, five little birds would starve.

Yesterday your brother threw a stone at me when I hopped into the road. Wouldn't it have been dreadful if he had killed me? Five little

mouths waiting, waiting, waiting to be filled and the mother lying stark and dead in the dusty road. Oh! it makes me all gooseflesh to think of it. Don't let your brother throw stones at us. We eat the worms that would soon strip the leaves from the trees. We have soft red breasts and look so pretty in the grass. Be good to us! Be good to us! See! See! See!

Gratefully yours, Mother Robin.

(3) Description of a picture:

———————

February 23, 1912.

Dear Uncle Harold:

When you wrote last from Paris you told me to be sure and see "The Horse Fair" at the museum when I had a holiday. Mother and I saw it yesterday. I counted the horses, though they seemed going so fast it was hard work. How alive they are! There is a fine sorrel in front, and the men seem so eager about their own particular horses. I could almost hear them shout "whoa!" and it seemed as if the horses' feet must be heard pounding the ground. Mother liked it, too. I can hardly believe that a woman painted it. I think she must have liked outdoor life and sports, and particularly animals. Thank you, dear uncle, for reminding me of it, and when you write again tell me what next to see.

Your loving nephew, ————————.

GRADE 6B.

(1) The arm chair tells its experiences:

Yes, Eva I am only the old arm chair your grandfather loved so. These worn arms, this hollow in the back, these bony springs in the seat know of many a strange tale. He used to tell stories of his life in Russia as he sat in this very chair. You remember he lost a finger? That was when he put his hand out to save you from the policeman's sword. He wore a cap! You know he had a scar across the temple and way back into the hair where he was cut with a sabre that time he would not give up his money to a soldier! It was a hard life. But he came to America and he had me to rest in. I never tired of him or his stories. How worn out I must be? But I am glad I could give grandfather a little comfort. Good night.

(2) Complaint to the Board of Health:

———————

———————

Mr. ————————:

Superintendent, Department of Health,

Fleet and Willoughby Sts., Brooklyn.

My Dear Sir:

For many weeks we have been annoyed by the bad odor of refuse which is dumped into the lot opposite our home. Everything from chicken feathers to feather beds is flung there. Will you not have the refuse removed, and post a warning to prevent people from using the lot as a dump? I hope you will for health and decency.

Very respectfully yours, ———— ————————.

(3) To father necessarily away from home:

_____

_____

My Dear Father:

How could I have let three weeks go by without writing to you? But let me explain. You know mother tried a long time to get the Clinic to help Willie's lameness. His muscles seemed to shrink up more and more, so that his leg was almost doubled up. On the Friday after you left I came home and found the neighborhood nurse talking to mother. She was saying that the Clinic could help him, and something must be done at once.

On Saturday, mother and I took him there. It was pitiful to see all the poor crippled children waiting their turn. Willie cried, but one of the nurses comforted him and told him how happy he would be when he could run like other boys. I have been taking him twice a week since then, and between times I had to fix his brace and help him dress.

Then he got the measles, and I had to stay home altogether to care for him. That's how it has been that I haven't written.

Willie is so much better now. You shall see. And with a few more treatments he will be cured. Isn't that fine? He can stretch his leg, but he must not bear his weight on it yet. It must grow strong.

Mother sends love and says she will write soon. Willie keeps asking when he will see you again. I hope the next letter will be to tell us you will soon be with us.

Your loving daughter,

_____ _____.

GRADE 7A.

(1) Condolence.

_____

_____

Dear Miss _____:

With great sorrow for you, I learn of the sudden death of your dear father. I remember you always spoke so happily of the good times you and he had together. Now you will have only the memory of those pleasant times. But I know you will be your old cheerful self, for you believe in spreading sunshine. We, too, will help and make the days pass as pleasantly for you as we can.

Your loving pupil,

_____ _____.

(2) The little Plymouth girl speaks from her picture:

From the Carved Black Frame,
Parlor, May 1, 1912.

My Dear Little Twentieth Century Friend:

You think I am only a picture girl, but you shall hear me talk, and then what will you say? You sometimes look up at me with those great brown eyes of yours, and push back your curls as if you would like to have me speak to you.

I am little Faith, who lives near Priscilla in Plymouth. You remember she came over in the Mayflower?

I often watch you at play and think how little fun there seems to be for a Puritan maiden. There is always some pewter to scour, some spinning to do, some linen to weave. Then on Sunday there is a long walk to church and a three-hour sermon. Could you keep awake through that?

Mondays we do the week's washing and I help. Then I sprinkle the linen on the green to make it bleach pure white. My kerchief is fine linen and my cap, and I made them both all by myself.

I haven't any pretty ribbons like you. My rich cousins in England have. But I have a pleasure you can never have. In the springtime I go into the woods and pick bunches and bunches of trailing arbutus so pink and fragrant. In the fall I gather wild grapes and help mother preserve them. Can you do that? I must go back to my picture. I may be missed. My paper is very yellow, and I do not write as you do, but I know you will be glad of a letter from

Your little Plymouth friend,

Faith.

(3) Request for Recommendation:

Mr. John Fowler,

Principal, Public School A, Brooklyn.

My Dear Mr. Fowler:

It will be necessary for me to leave school immediately, as my father has lost his position, and I must go to work.

A certain wholesale shoe dealer whom I know will give me work in his factory if I can obtain a good recommendation from school.

Will you kindly permit me to use your name as reference, and will you try to remember my good record, both as to studies and conduct, if you are called upon to vouch for me?

Believe me, I will earnestly endeavor to bear out what you say of me. Thanking you in advance for your appreciated courtesy, and trusting for a favorable report, I am

Most respectfully yours,

_____ _____.

(Stamped envelope for reply, to be enclosed.)

GRADE 7B.

(1) Request to visit hat factory:

_____

_____

Mr. Abraham Burns,

Franklin Avenue, Brooklyn.

My Dear Sir:

Our class at school is studying industries and would like to visit your factory so see how men's hats are made.

We should like to see every phase of the work that can be seen—from the cleansing and manufacturing of the felt to the finished hat.

Will you kindly extend us the courtesy of a reply, and state whether it will be convenient, and if so, on what afternoon we may come. There are forty-five pupils in our class. Thanking you, I am, for the class,

Most respectfully yours,

_____ _____.

(Enclose stamped and addressed envelope.)

(2) Description of visit to hat factory:

_____

_____

My Dear Fred:

Last Thursday we had a jolly time visiting Burns's hat factory. We forty-five were placed in the care of a guide who explained, and who answered questions. First we saw where the felt is minced by machinery. Here the men must wear mouthpieces to protect against inhalation of fur particles.

Then we were shown into the blocking department, which is very warm and dry. The men were constantly sponging hands and faces. Here hats are given shape and dried ready for trimming.

The finishing department is quite interesting. Here sit a lot of girls with piles of unlined, unbound hats in front of them. They work in groups, one girl laying in the lining, another sewing in the sweater band, a third putting on the silk ribbon band around the outside and around the rim. These girls must furnish their own needles and silk for sewing. They must work very hard for very little money. The stiff felt and the stiff leather are hard to pierce. To get much done, a person must be very quick, and attend strictly to business. The girls hardly knew we were in the room. They are paid by the number of dozen hats they finish. Hats are turned out by the hundreds. Where they all go is a puzzle. But they certainly go, or Burns couldn't keep up such a thriving establishment.

You're engaged for the Saturday ball game, you know. We meet at the usual place.

Sincerely,

George.

(3) Letter of apology and explanation.

_____

_____

My Dear Sarah:

Your letter of a month ago should certainly have been answered before this, and would have been if mother had not had so much company and school had not demanded so much study.

Our cousins from Philadelphia spent the first week in April with us, and we showed them the town. There was at least one amusement for each day, and on the Saturday before they left, we had an auto ride to Long Beach from nine till noon, lunched at home, were out again for the matinee at the Knickerbocker, and were invited to a dinner party and a musicale in the evening. Both Selina and Paul are fine musicians and were in their element.

As for school, I am deep in the study of verbals and have an abstract of Evangeline's Wanderings to get ready by Monday.

How are you all? Will you send that recipe for making biplane cake? I want to surprise the girls with one on Friday next. Give my love to Aunt Amy and Cousin Will, and as for yourself, I am

Your loving cousin,

Ray.

GRADE 8A.

(1) Betty of Long Island to a New Jersey Cousin.

Jamaica Turnpike, Sept. 23, 1776.

My Dear Sallie:

It is now September and the grapes are ripening, but what a summer we have had! There was that great English fleet blocking up our beautiful harbor, and, what is worse, bringing a swarm of red-coats to our shore.

My uncle always said it was unwise to leave Jamaica Pass unguarded, but everyone pooh-poohed it, and said the British were too indolent to go round Robinhood's Barn.

Alas! Just what they did do, and so our poor soldiers were caught! I am faint when I think of what a narrow escape our Washington had with his army.

For a time, while Howe was watching our camp fires, and thinking he had caught Washington, no one breathed. Then it spread like wildfire. The army had escaped in a fog, and were hurrying north! Of course, Howe took New York. That couldn't be prevented, but he didn't catch our Cincinnatus.

Now we are watching to see how W. will manœuvre next. Perhaps by the time this reaches you we will have Christmas snows.

My good wishes go with it, and mother and father send you all their best respects.

Do write soon when you get this, and tell me how the war is going in your province.

Your loving cousin, Betty.

(2) To cousins in a western city who contemplate moving east.

That you are really coming to Brooklyn, dear old chum, makes me thrill with glee. What games of tennis we shall have! What good times shopping! and the boys may carry out their plan of a model aeroplane and organize their baseball nine!

One thing will comfort you. Your laundry will be less. You can wear your tub dresses a long time if you are careful. I wear mine half a season when new.

Shall I ever forget that first trolley ride in Cincinnati! You know how grimy my pretty white dress looked in half an hour. No, you needn't feel so large because you advised me not to wear it. How could I go about in a thick, stuffy dress in July? And your dress was blue lawn, if you remember. Such a pretty dress!

Father says it is just the time to start a factory in this neighborhood. People are more and more desirous of buying substantial, well-put-together ready-made garments, and there are hundreds looking for work. I know it will be a success.

Joe is already scheming how he and Louis will make things hum.

In your next write me more at length as to your plans, will you?

Your loving cousin,

Gertrude.

(3) The cat pleads for kind treatment.

Dear Big Brother:

Yes, it was I that just rubbed against your leg. I am glad you don't kick me or push me away. That hole in my ear? Your brother Harry chased the terrier after me and he nipped me there, but I gave him one deep scratch and he ran away yelping. Even a cat must protect her rights. My eyes are different? Your Harry shied a cinder at me on the day the ice was so slippery and I couldn't dodge it in time. So I can't see out of the eye he struck.

Yes, my tail is only a stump, because the butcher hacked at me once when I was stealing some trimmings. A cat's life is hard. I don't know why I am here, but I must live and eat and have a little pleasure.

Is anyone ever kind to me? Well, that four-year-old baby over there gives me a bit of his bologna and strokes me. He goes to kindergarten. He feels sorry for me.

You promise to be kind? Thank you! Purr! Purr! Yes, I will catch the mice for you, and I will remain

Your obedient

Pussy.

GRADE 8B.

(1) Lucius to his Greek mother.

My Precious Mother:

Your well-born son only a Roman gentleman's slave! But it is not so unpleasant because Brutus and Portia are most kind to each other and to me. My duties are to wait upon Brutus, to carry messages and to play my lute for him when he is troubled or tired.

I see many great Romans, Cassius, Antony, Casca, but no one is so noble as my master. They are all selfish or revengeful. Brutus is big hearted and trusting. Antony is the wittiest, and he hates Cassius—calls him lean and sour.

It is not my business, but I fear Brutus is going to do a terrible thing. I catch only a word here and there, for I must watch when the friends come to the house, so as to wait upon Brutus if he needs me. I get so sleepy. But Brutus never scolds me.

He loves my playing, although he seems not to hear it, he is looking far off.

Ah! there I hear the men going out. They are all muffled up. Good night, mother. Soon I may be with thee again.

Your loving Lucius.

A lesson on letter writing in Caesar's time might be helpful and profitable here—the stylus, the wax tablet, the scroll, etc.

(2) Teaching a boy how to swim.

Old Fellow:

As you suggested, I am giving Herbert swimming lessons. The first time he shivered a great deal, and seemed gagged when chum pushed him under. I put a stop to that. I never could see why a fellow should be made nearly to drown before he swims.

I made Bert use a life preserver, and kept him swimming a long time with that help. He begged to try without. Well, I gave him his will and he took two strokes pretty well, then went under. When he came up his eyes were wild and his nostrils white. He was scared.

Little by little he has gained confidence. He never will be a swimmer, but he will know what to do if he is in a rowboat and it capsizes. We have practiced that a great deal.

He can now jump into the pool from the swimming board, and can keep himself up very well. But it has been the hardest six months I know.

Can you suggest any easy way for a fellow to learn to swim?

Sincerely, as ever, ———— ————.

(3) Lincoln to Critics.

Executive Mansion, September 1, 1861.

My Dear Friends:

The ladies like laces and silks, so why should they not have them? It is good for trade and trade is the backbone of a successful country.

You believe that in these hard times the women should put the money they usually spend in finery, to use at the hospitals and supply stations. They do send their portion, bless them! And if they ask a little innocent extravagance, I am too much a man to gainsay them. What fellow will give up his evening smoke to swell the coffers for the sick and wounded? What man will deny himself wines and liquors for the good cause? What! Only silence for an answer? Then say no more, gentlemen, but let the ladies have their innocent indulgences. From

Their friend and yours, Abraham Lincoln.

The series of letters preceding do not pretend to be model, in the sense of being specimens of literary merit; they merely endeavor to present ideals and suggestions to the young writer, who is often puzzled as to procedure, and finds letter writing very difficult.

The writer has thought of actual children, actual incidents, actual experiences in formulating the letters, and believes they will serve the purpose for which they may be used, namely, to stimulate thought in the youthful writer and to inspire him or her to express that thought to some degree of satisfaction.

Tests—6A

Arithmetic.

I.

A farmer had 28 bu. 3 pk. 7 qt. of apples. He sold 44 4/9% of them. What quantity did he sell?

What is the difference in weight between 75% of a ton and ¾% of the same?

4½ × 3¼ is what % of 80?

Change 1876 inches to higher denominations.

Value of oil in a tank which is 7 feet square and 11 feet deep, when it is 50% full at $.12½ per gallon?

At $.37½ per square yard, how much will it cost to paint the outside of a tight board fence, 6 feet high, around a field 200 feet long by 150 feet wide?

From 18 gal., 3 qt., 1 pt. of oil in a barrel 2 gal., 3 qt., 1 pt. leaked out. % of leakage.

Wages of a man who worked every day from March 5 to August 28, 1907, at $2.50 per day.?

What is the volume of a tank 11 ft. square and 9 ft. 4 in. deep?

A bin 20 ft. long, 12 ft. wide and 5 ft. high is full of wheat. What will it cost to paper outside at 10c. a square yard?

A farmer sold 46% of his potatoes and had 516 bu. left. How many bu. did he raise?

Value of oil in a tank 33 ft. long, 7 ft. wide and 12 ft. high, when 75% full, at $.25 per gal.? (231 cu. in. = 1 gallon.)

II.

Which is more, 3½% of 800 or ⅕% of 10,000?

Cost of gold tray weighing 3 lb. 6 oz., at $20 per oz. Troy.

Cost to fence a field 50 ft. long and 32 ft. wide at 12½c. per yd.?

A man weighs 3 lb. 8 oz. of butter in 1 minute. How much butter can he weigh in 6 minutes.

If it costs a dealer $245 to build a piano, what will his % gain be if he sells it for $343?

If two men, J. and K., each have $560, and J. spends 37½% and K. ⅜% of their money, how much more does J. spend than K.?

How many cu. in. of space will be needed to hold 596 gallons of oil?

Two miners produce 15 pwt. 18 grains of gold each week; how many oz., pwt., gr., will be the share of each at the end of 28 weeks?

Find the number of days between Jan. 15, 1908 and Sept 28, 1908.

Make out and receipt a bill for the following goods, which James Grogan bought of A. D. Matthews' Sons, Aug. 21, 1907.

12 yds. lining at $.15 a yard; 2 oz. spools of cotton at $.40 a doz.; 6 collars at 2 for $.25; 1 pair gloves, $1.50.

Write a check for payment.

Dictate for addition: 598,007; 20,065,006; 675,009,008; 423,289,761.

III.

How long a time has passed from the surrender of Cornwallis at Yorktown, Oct. 19, 1781, to the present date?

If a field of 45 acres yields 40 bus. 3 pks. 5 qts. of wheat to the acre, how much does the whole field yield?

A man having a salary of $1,800 per year spends 15% for board, 8 1/3% for clothing, and 16% for other things. How much money does he spend?

Make a bill of the following, and receipt it:

You buy of Abraham & Strauss, dry goods merchants, Fulton street, Brooklyn, June 15, 1906:

3 pieces of ribbon, each 16 yds., at $.06¼ a yard.

3 doz. handkerchiefs, at the rate of 3 hdkfs. for $1.00.

42 buttons at $2.19 per doz.

1,250 nail heads at $.17 per M.

175 buttons at $.28 per C.

24 yds. cloth at $1.62½ per yd.

A bin 16 ft. long, 9 ft. wide and 4 ft. deep. How many bushels will it hold?

A plot of ground 20 rods long and 16 rods wide, is enclosed by a fence 6 ft. high. How many square yds. in one surface of the fence.

If I buy oranges at 2 for $.05, at what rate must I sell them to gain 20%?

$(6\frac{1}{2} + 9\frac{1}{4}) - (\frac{3}{4} \times \frac{7}{8}.)$.

Geography.

1. a. Why do the British Isles and Labrador differ in climate?
   b. Why is the eastern part of Europe colder than the western part?
   c. Why is Southern Europe so warm?
2. a. Describe the coast lines of Europe and South America.
   b. Which has most good harbors?
3. Name the longest river system of South America; through what country does it flow and in what direction?
4. How will the Panama canal help the Western part of South America?
5. What form of government have most South American countries?
6. a. Which country in South America has the most railways?
   b. What effect will the Panama Canal have upon commerce?
   c. Name a steamship line by which one could go from New York to London?
   d. From New York to Glasgow?
   e. From New York to England and Germany?
7. Name one important occupation in:
   a. Brazil

b. Peru
c. Chile
d. Argentina

8. a. What effect has altitude on climate?
b. What effect has latitude on climate?

9. a. Through what waters would a boat sail going from New York to Rio Janiero?

b. What would it carry to Rio Janeiro and with what would it be laden on its return?

10. Where are the following found in South America? Quinine, cabinet woods, rubber, wheat, nitra, wool, coffee, beef and hides and rum?

11. In which country and for what noted is each of these cities:
d. Rio Janeiro, Para, Buenos Ayres, Santos, Valparaiso, Lima.

12. a. Name four important colonies of the British Empire.
b. Name one colony of France.
c. Name one colony of Holland.

History.

I.

1. Give two causes of the Revolution. How long did the war last? Who was king in England during the Revolution?

2. Why did England pass the Stamp Act? Why did the patriots object? What did Patrick Henry say about the Stamp Act?

3. Where is Concord? What happened there at the beginning of the Revolution? What year?

4. What was the greatest battle of the Revolution? Where was it fought? When? Who was commanding on each side? What was the result?

5. Name two Europeans who helped us in our war for independence.

6. Describe a naval battle during the War of 1812.

7. Why is our government under the Constitution stronger than it would have been under the Articles of Confederation? Who became the first President? When?

8. A law is passed that the people in the United States shall be counted. (a) Who passes such a law? (b) Who must sign it? (c) How often are the people in this country counted?

9. Who is Commander-in-Chief of the United States Army? How often is he elected? Who can not be elected President?

10. Tell something about: (1) Benjamin Franklin, (2) Nathaniel Greene, (3) Robert Morris, (4) Andrew Jackson.

II.

1. (a) What were the general causes of the Revolution? (b) Give five causes of the Revolution that are enumerated in the Declaration of Independence.

2. Describe the Battle of Trenton, giving date. Why was this an important victory?

3. Describe the Battle of Saratoga, giving date and opposing generals. Why was the battle important in its effects? What aid did it secure to America?

4. Describe the Lewis and Clark expedition giving: (a) date, (b) starting point, (c) course, (d) country explored, (e) President during whose term expedition was made, and (f) length of time it took to make the expedition.

5. Give (a) cause of War of 1812, (b) England's excuse for searching American ships, (c) describe the Battle of New Orleans.

History and Civics—8B

Give the text of the thirteenth amendment to the constitution of the United States.

Compare the thirteenth amendment with Lincoln's Emancipation Proclamation.

Write from memory section 1 of the fourteenth amendment. Why was it necessary to adopt this amendment?

State the fifteenth amendment. Why was it passed?

What is meant by Reconstruction?

Differentiate between Lincoln's and Johnson's Reconstruction plans.

Describe the antagonism between Johnson and Congress.

Describe the final form of the Reconstruction Act.

Discuss the impeachment of President Johnson.

Show the importance of the purchase of Alaska with regard to

(a) Territorial growth of the United States.
(b) Commercial aspect.
(c) Production of gold.

Give the facts leading up to, and the settlement of, the Alabama Claims.

In connection with the industrial growth of the United States, discuss briefly the development of

(a) The steel industry,
(b) The oil industry,
(c) The sugar industry,
(d) The beef industry,
(e) The great business enterprises commonly known as "trusts."

Show how the transcontinental railroads affect population and industry. Name three transcontinental railroads.

What was the "Spoils System"?

What sad event brought the evils of the Spoils System to the attention of the American people?

What great reform displaced the Spoils System?

Show the difference between emigration and immigration.

When did the tide of immigration turn toward the United States?

Why do immigrants come to the United States?

How does the United States solve the immigration problem today?

Do you think immigration should be further restricted? Give reasons for your answer.

Name the five largest cities in the United States. Locate them, and tell why they became the largest in the country.

Outline the causes, conduct and conclusion of the Spanish-American War.

Make a list of the dependencies of the United States, giving date and manner of acquisition.

Point out the advantages of the Panama Canal to the world in general and to the United States in particular.

Explain: Carpet-bagger, Ku Klux Klan.

Write a sentence on each of the following: Horace Greeley, Rutherford B. Hayes, Samuel J. Tilden, Edwin M. Stanton, James A. Garfield, James G. Blaine, Chester A. Arthur, Grover Cleveland, William McKinley, Theodore Roosevelt, William H. Taft.

Name the present governor and lieutenant-governor of New York State. Give the chief powers and duties of each.

Compare the legislative branches of the city, State and nation in regard to

(a) Nomenclature of legislative bodies.
(b) Legislative functions.

Imagine that you are a newly-landed immigrant. Describe the steps that would be necessary for you to become a United States citizen.

How does the Board of Education secure funds to conduct the schools? What is a budget?

How does New York City secure money to pay the expenses of the various departments?

What is the difference between a primary election and a general election?

How many counties are there in New York State?

What is the purpose of a court? State the functions of the judge and jury.

Name the rights of an accused person in this country.

Name five penal and five charitable institutions in New York State.

Write a short composition on the duties of a citizen.

Arithmetic—8A*

NINETEENTH WEEK.

Review of the equations.

Oral and Drill.

$$(1)\ x + \frac{2x}{3} + \frac{3x}{4} = 45\%, \quad \frac{3x}{4} = 21. \qquad (2)\ \frac{2x}{3} - \frac{3x}{5} + 6 = x + \frac{3x}{10} - 31,$$

$$(3)\ \frac{2x}{3} - \frac{3x}{5} \times \left(\frac{3x}{10}\right) = -37. \qquad (4)\ x - \left(\frac{x}{2} + \frac{x}{3}\right) = 3, \quad 16 - \frac{2x-5}{3}$$

*Continued from MONOGRAPHS of October, 1912.

$= x + 6$, $2x - 4(2x - 5) = 2$. (4) $16 = \frac{2x - 5}{3} + x + 6$, $16 - 6 = \frac{2x - 5}{3} + x$. (5) A and B together receive \$700, B's share being \$40 more than twice A's. What is the share of each? (6) After spending ½ of his money, then ⅓ of the remainder, then ¼ of this remainder, and finally ⅕ of the sum then remaining, a man has \$50 left. How much had he at first? (7) A man paid \$342 for a piano. Find the list price when discounts of 25% and 20% were allowed and 5% for cash. (8) $6(2x - 5) = 5x + 12$. (9) $7(x + 2) = 3x + 50$. (10) $2(x - 1) - 2(2x - 19) = 3(x - 3)$. (11) $\frac{11 - 3x}{2} + 5x = 19$. (12) $\frac{x - 1}{2} + \frac{x - 2}{3} = 8$. (13) $\frac{7x - 8}{9} - (x + 2) = \frac{4x + 5}{6} - \frac{x + 2}{3}$. (14) $\frac{x}{4} + \frac{x}{5} + \frac{x}{6} + \frac{x}{8} + 31 = x$.

Written.

(1) Find value of x in the equation: $\frac{x}{2} - 3 + \frac{x}{3} = 2$. (2) A rectangular field has a length which is 4 times its width. Its perimeter is 300 rds. Find its area. (3) A man paid \$500 for 2 horses. One cost ⅔ as much as the other. Find the cost of each. (4) Divide 30c. between 2 persons, so that one shall have 50% more than the other. (5) How many acres are contained in a rectangular field whose breadth is 70 rds. shorter than its length, and whose perimeter is 460 rds.? (6) What per cent. is gained on an article bought for \$60 and sold for \$84? (7) Find the sides of a rectangle whose area is 4,800 sq. yds., one side being 3 times as long as the other. (8) A horse was sold for \$240, the seller thereby gaining ⅓ of what he originally paid for it. (9) One-half a number added to ¼ of the same number equals 66 2/4. What is the number? (10) Find a fraction equivalent to ⅞, the sum of its numerator and denominator being 60. (11) The length of a rectangular lot is 75 ft. more than the breadth. The distance around it is 250 ft. What are its dimensions? (12) At a certain election 2,436 votes were cast for 2 candidates, the successful one receiving 318 more than his opponent. How many votes did each receive? (13) The sum of 2 numbers is 96 the difference is 72. Find number.

Twentieth Week—General Review.